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MELBOURNE

THE CHIRONOMIDAE (DIPTERA) OF AUSTRALIA

By P. Freeman*

[*Manuscript received November* 2, 1960]

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Summary

This is a systematic account of the species of Chironomidae from Australia based mainly on collections in Australian museums, the British Museum, and the United States National Museum. One hundred and twenty-nine species are described, 69 of them new, and keys are given to subfamilies, genera, and species. The classification proposed by Brundin (1956) has been adopted; in this, the subfamilies Diamesinae, Clunioninae, and Corynoneurinae are treated as, at the most, tribes of the subfamily Orthocladiinae.

Type specimens of species described by Macquart, Walker, and Skuse have been examined and the species redescribed and figured; an attempt has been made to identify Kieffer's species, the types of which are probably lost.

Some account is given of the composition of the fauna, and the presence of an element in the more primitive genera similar to the fauna of the southern part of South America has been noted.

Introduction

The first comprehensive work on the Australian Chironomidae was undertaken by Skuse in 1889 in his series on the Diptera of Australia. He described 46 new species and three new genera, and mentioned in passing the seven species described by earlier authors (six by Walker and one by Macquart). Since Skuse's work, Kieffer has described 21 species and Womersley a further two, so that a total of 76 species has been reported from Australia.

Although both Skuse and Kieffer have offered keys to species, it is not at all easy to name species from their papers, particularly when advances in the taxonomy of the group in the last thirty-five years are taken into account. It seemed that a review of the known species and a study of the material in Australian and other museums was now due.

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* British Museum (Natural History), London.

In writing this paper it was found necessary to confine attention to the main continental mass of Australia rather than take in the whole Australasian Region. It was, therefore, decided to follow the definition of Australia given by Mackerras (1956) which was "the mainland, the Torres Strait Islands, and Tasmania". Wherever I have used "Australia" in this paper, it is in that sense.

LOCATION OF MATERIAL

The work was carried out in the Department of Entomology of the British Museum (Natural History) but it is based to a great extent upon material from the collection of the School of Public Health and Tropical Medicine, University of Sydney, supplemented by collections at light made by Mr. D. J. Lee of that Department. Additional fresh material has been received from Mr. D. H. Edward, University of Western Australia, and Mr. J. Martin, University of Melbourne. Other museum material has been borrowed from the South Australian Museum, the National Museum of Victoria, the collection of the Division of Entomology, C.S.I.R.O., Canberra, the United States National Museum, Washington, and the Macleay Museum, University of Sydney, where practically all the types of the species described by Skuse are housed.

All but one of Kieffer's species were described from specimens belonging to the Hungarian National Museum where they were probably destroyed in the recent disastrous fire; the type of the other species and of two additional Oriental ones were borrowed from the Deutsches Entomologisches Institut, Berlin.

The types of the Walker species are all in the British Museum. The type of the single Macquart species is from the Bigot Collection, and is now also housed in the British Museum. The paratypes of one of Womersley's species are in the South Australian Museum, Adelaide.

Great numbers of the specimens examined in the course of this work have been collected by comparatively few collectors, and the collections are often all in the one institute. The names of these collectors and of the institutes holding their collections are listed below to avoid constant repetition in the text. The abbreviations by which the institutes are referred to in the text are also given.

Collector	Institute	Abbreviation
D. H. Edward, J. A. L. Watson	British Museum (Natural History), London	BM
K. English, A. L. Tonnoir*	Division of Entomology Museum, C.S.I.R.O., Canberra	CSIRO
F. A. A. Skuse	Macleay Museum, University of Sydney	MM
F. E. Wilson	National Museum of Victoria, Melbourne	NM
F. H. Taylor, T. L. Bancroft, D. J Lee, R. H. Wharton, A. L. Tonnoir†	School of Public Health and Tropical Medicine, University of Sydney	SPHTM
W. W. Wirth	United States National Museum, Washington	USNM
D. H. Edward, J. A. L. Watson	Western Australian Museum, Perth	WAM

* Institute has all specimens collected by Tonnoir *except* those from Tasmania and Victoria.

† Institute has specimens collected by Tonnoir from Tasmania and Victoria only.

DISTRIBUTION AND AFFINITIES OF THE AUSTRALIAN CHIRONOMIDAE

The species and genera of Chironomidae do not lend themselves to a study of zoogeography because so many of them appear to have a very wide distribution. It was found in work on the African fauna that the majority of the species fell into genera well known in other Regions and that within the continent any one species may occur in areas with very different climatic conditions: the same seems to apply in Australia, where many of the specimens sent to the author from Western Australia appear to belong to species occurring also in New South Wales.

The greatest number of species is to be found in New South Wales, Victoria, and Tasmania, but the reasons for this may be either that there are more entomologists making collections in that area or that the climate and topography are more suited to such insects. It is to be hoped that publication of this account will stimulate interest, so that the drier areas will receive more attention.

As is to be expected, the Orthocladiinae are more numerous in the cooler areas of the south east, whilst the Chironominae are more abundant in the hotter regions. This is in accord with results elsewhere.

Fifty-one genera are recognized, 12 of them new. This total should not be compared with that in other papers by the author because the Orthocladiinae have been subjected to a much greater degree of splitting than previously, in conformity with the views of Brundin (1956).

There are four elements in the chironomid fauna:

(1) *Species belonging to well-known genera.*—The majority of species are quite typical members of well-known genera which occur in most of the Zoogeographical Regions of the world. Examples of these genera are: *Pentaneura, Procladius, Cardiocladius, Cricotopus, Metriocnemus, Corynoneura, Chironomus* (several subgenera), *Stenochironomus, Polypedilum, Tanytarsus,* and many others. There is nothing peculiar or particular about these species, they are simply other examples of the genera to which they belong.

(2) *Species occurring also in other Zoogeographical Regions.*—Most, though not all, of these belong to well-known genera and seem to be indistinguishable from species known from other Old World Zoogeographical Regions. Examples are: *Clinotanypus crux* (Oriental), *Podonomus kiefferi* (Holarctic), *Smittia aterrima* (Palaearctic and Africa south of Sahara), *Chironomus* (*Dicrotendipes*) *pilosimanus* (Palaearctic and Africa south of Sahara), *Conochironomus acutistilus* (Africa south of Sahara), *Polypedilum* (*P.*) *nubifer* (Palaearctic and Oriental), *Lauterborniella fuscoguttata* (Africa south of Sahara), *Tanytarsus* (*Cladotanytarsus*) *? mancus* (Palaearctic). These give good examples of the enormously wide distribution of some species in the family.

(3) *Species showing affinity with Patagonia and South Chile.*—This is a small but quite definite element and affects mainly the more primitive or

apparently primitive genera. For example, in *Podonomus*, one species appears actually to be identical with a South American species, whilst a second is very similar to another. *Diplocladius* subgenus *Stictocladius* is known only from southern South America and New Zealand: there are three new species in south-east Australia and Tasmania. *Rhinocladius* with two South Chilean and Patagonian species now has a third in Tasmania and Victoria. A new genus, *Austrocladius*, is needed for *Chaetocladius*-like species from Australia, New Zealand, and southern South America. Similarly a new genus, *Megacentron*, is needed for an Australian and for a southern South American species, whilst *Riethia* includes species from New Zealand, Australia, Papua, and southern South America. All these genera show primitive characters, possibly suggesting a relict fauna or else land connections at a time when the family was evolving.

(4) *Peculiar Australian genera*.—Nine genera (five monotypic), containing 16 species are known only from the Australasian Region. Certain of these are probably peculiar, but further collecting elsewhere may show others to include species in other Zoogeographical Regions. The nine genera are: *Coelopynia, Austrobrillia, Nasuticladius, Allometriocnemus, Kiefferophyes, Imparipecten, Harrisius, Parvitergum, Paraborniella.*

To sum up, the larger part of the fauna consists of species belonging to well-known genera with species distributed in other Zoogeographical Regions, but there does exist a small pocket of about 12 species, especially in south-east Australia and Tasmania, showing strong affinities with the fauna of Patagonia and South Chile. There is also a group of 16 species belonging to genera so far known only from the Australasian Region. These two groups account for 28 species out of a total of 129 considered in this paper.

STRUCTURES OF TAXONOMIC IMPORTANCE

A detailed account of the structures of taxonomic importance in the Chironomidae is given in Part I of the author's study of African Chironomidae (Freeman 1955*c*), but the following notes are given for convenience.

Head.—Male antennae have the last segment (or last 2 in Tanypodinae) greatly lengthened and the ratio of this lengthened segment to the short basal flagellar segments taken as a whole is given as "antennal ratio" (A.R.). The eyes, especially of the males, have a dorsal narrow portion, the development of which may differ between genera and subfamilies (usually absent in Orthocladiinae). On the frons, between the eyes, are two short "frontal tubercles" in some species.

Thorax.—The thoracic markings follow a definite pattern throughout the family, with areas of muscle insertion darker than other parts of the cuticle. The horizontal flight muscles give two short central darker bands in the front half of the mesonotum and a dark area at the apex of the scutellum. The vertical muscle insertions form darker areas laterally in the posterior half of the mesonotum and in the lower part of the sternopleuron. The areas of insertion on the mesonotum are termed "mesonotal stripes" and they are separated by the median rows of acrostichal bristles and the more lateral dorsocentral bristles.

Legs.—The ratio of anterior basitarsus to tibia is termed "leg ratio" (L.R.); the same ratio for the other legs is termed "middle" or "posterior" L.R. The tarsal beard is the row of long hairs seen along part of the anterior tarsus of the males of some species; the hairs are several times as long as the diameter of the segments.

Wings.—The wing venation employed uses Tillyard's modification, whereby Cu_1 of earlier authors is regarded as M_{3+4}. The crossvein *m-cu* of previous authors then becomes the true base of this vein and the cubital fork a compound fork which is here termed the "posterior fork". Cu_2 of previous authors is now Cu_1, Cu_2 being the fold behind Cu_1.

Male hypopygium.—The 9th tergite in many species carries an apical prolongation termed the anal point. The main claspers are termed coxite and style; the coxite bears two pairs of inner appendages in most Chironominae, an upper "appendage 1" and a lower "appendage 2"; both appendages may bear accessory appendages, 1*a* and 2*a*, especially in species of *Tanytarsus*. In the other subfamilies, the coxites either do not bear appendages or they are much simpler.

KEY TO SUBFAMILIES OF THE CHIRONOMIDAE

1. True base of M_{3+4} (*m-cu* of previous authors) present 2
   True base of M_{3+4} absent 4
2. R_{2+3} forked (in some small species of *Pentaneura* it may be crowded out, but then wing very hairy) .... TANYPODINAE
   R_{2+3} either simple and unforked or absent, even though the radial veins are well separated 3
3. R_{2+3} completely absent, radial veins well separated; postnotal furrow absent .... PODONOMINAE
   R_{2+3} simple and distinct .... ORTHOCLADIINAE (in part)
4. Ratio of anterior basitarsus to tibia (i.e. L.R.) less than 1; tibial combs of posterior 4 legs not composed of short basally fused spinules; male styles folded inwards .... ORTHOCLADIINAE
   L.R. nearly always more than 1, very occasionally about 1; tibial combs formed of short basally fused spinules; male styles directed rigidly backwards (with possible exception of *Parvitergum*, gen. nov.) .... CHIRONOMINAE

Subfamily **TANYPODINAE**

Base of M_{3+4} present (*m-cu* of Edwards and other authors), vein R_2 present as a fork at the end of R_{2+3}, though occasionally in some small species of *Pentaneura* the whole of the latter may be crowded out by the close approximation of R_1 and R_{4+5}. Male antenna with 15 segments, the 15th being formed at the apex of the elongated 14th; female antenna with 11–15 segments. Male hypopygium with styles folding inwards and each carrying a distinct spine at the apex or near it; coxites usually lacking inner lobes or appendages.

The Tanypodinae resemble the Podonominae and the Orthocladiinae, tribes Protanypini and Diamesini, in the retention of the base of M_{3+4}, a character usually considered to be primitive. The larvae are carnivorous, feeding mostly on other chironomid larvae.

All the well-known genera, except *Tanypus*, are represented in the Australian material at the author's disposal, and, in addition, a new genus which suggests a link between *Anatopynia* and *Coelotanypus*. As there are specimens of a typical species of *Tanypus* from Java in the British Museum, that genus is included in the key.

KEY TO GENERA OF THE TANYPODINAE

1. Fourth segment of tarsus cordiform or bell-shaped, wing membrane lacking macrotrichia 2
   All tarsal segments cylindrical, macrotrichia present on wing membrane (difficult to see or even absent in some species of *Procladius*) 4
2. Posterior fork with well-formed stem distal to true base of M_{3+4}, about half as long as Cu_1 .... *Clinotanypus* Kieffer
   Posterior fork with stem either very short, about half as long as base of M_{3+4} or else fork basal to this vein 3
3. Posterior fork distal to base of M_{3+4}, mesonotum with oval central tubercle .... *Coelotanypus* Kieffer
   Posterior fork basal to base of M_{3+4} (as in *Anatopynia*, see Fig. 2), mesonotal tubercle absent .... *Coelopynia*, gen. nov.
4. Posterior fork stalked 5
   Posterior fork basal to true base of M_{3+4} 6
5. Central mesonotal tubercle present, stem of posterior fork less than one-third as long as Cu_1 .... *Tanypus* Meigen
   Tubercle absent, stem of fork about half as long as Cu_1 .... *Procladius* Skuse
6. Female antenna with 11–13 segments, costa normally not produced, smaller species 7
   Female antenna with 15 segments, costa always distinctly produced, larger species .... *Anatopynia* Johannsen
7. Tibiae without black rings, occasionally slightly darker at the knees, prescutellar area not well defined and with the acrostichal bristles running across it .... *Pentaneura* Philippi
   Tibiae with 3 or 4 well-defined black rings, prescutellar area well defined, more or less circular, acrostichal bristles diverging around it .... *Ablabesmyia* Johannsen

Genus PENTANEURA Philippi

Pentaneura Philippi, 1865, p. 629. Edwards, 1929, p. 287. Freeman, 1955*c*, p. 20; 1959, p. 399 (as subgenus *Pentaneura*, s.s.).

Isoplastus Skuse, 1889, p. 279 (nec *Isoplastus* Horn, 1880 — Coleoptera).

Type species (monobasic) *Pentaneura grisea* Philippi, 1865.

Wings densely hairy and sometimes with a pattern of dark macrotrichia; costa not produced, or only exceptionally so, base of M_{3+4} placed immediately beyond the posterior fork. Antenna of female with 11–13 segments. Pronotum more reduced than in other genera of the subfamily; prescutellar area not well marked, acrostichal bristles running across it. Tibiae without well-defined black rings, tarsal spurs and pulvilli usually absent.

I prefer now to use this genus in its stricter sense, according *Ablabesmyia* full generic status.

KEY TO AUSTRALIAN SPECIES OF THE GENUS PENTANEURA

1. Wings with dark markings arranged as in Figure 1, *b* .... *formulosa* Skuse
   Wings with fewer or no dark markings 2
2. Wing pattern as in Figure 1, *a*, that is, with discrete spots .... *punctipennis*, sp. nov.
   Wing pattern either absent or occupying most of basal half 3
3. Small pale species with brilliant pruinose shoulders, female with dark macrotrichia in basal half of wing, middle L.R. 1 .... *parva*, sp. nov.
   Larger darker species lacking brilliant pruinose shoulders, no wing markings in either sex, middle L.R. less than 1 .... *levidensis* Skuse

PENTANEURA LEVIDENSIS (Skuse)

Isoplastus levidensis Skuse, 1889, p. 281. Kieffer, 1906, p. 44.

Thorax brown with some pruinosity, legs pale, middle L.R. 0·75, wings unmarked, abdominal segments 1–5 dark on basal halves.

Wing length.—1·75–2·25 mm.

Male.—Head and mouthparts brown, antennae rather paler, A.R. 1·25, eyes bare. *Thorax* brown, shoulders paler, pruinose on shoulders and between stripes, but not strongly so, bristles pale. *Legs* pale yellowish, L.R. of front legs 0·8, of middle legs 0·75. *Wings* without any trace of dark areas or patches of dark macrotrichia, costa very slightly produced, halteres pale. Abdomen largely pale; segments 1–5 with dark bands occupying basal halves, 6 and 7 dark, 8 entirely pale, claspers dark; hypopygium simple, styles tapered.

Female.—Resembles male, abdomen darker and more uniformly banded.

Type.—Holotype ♂, type locality Wheeney Creek, Hawkesbury district, N.S.W. (MM) (seen by author).

Specimens seen.—QUEENSLAND: Townsville, F. H. Taylor, 2 ♂♂. NEW SOUTH WALES: Yass, Sept. 1931, K. English, 1 ♀; Colo Vale, 6.iv.1957, W. W. Wirth, 1 ♂. AUSTRALIAN CAPITAL TERRITORY: Blundell's, Jan.–Apr. 1930, A. L. Tonnoir, 3 ♂♂; Canberra, Oct. 1930, A. L. Tonnoir, 1 ♂. VICTORIA: Kilmore and Millgrove, F. E. Wilson, 2 ♂♂; Cudgee, 1 ♂; "Victoria", G. F. Hill, 2 ♂♂ (NM). TASMANIA (all coll. by A. L. Tonnoir): Advent Bay, Jan. 1922; Burnie, Oct. 1922, 1 ♀; Eaglehawk Neck, Nov. 1922, 1 ♂; Geeveston, Dec. 1922, 1 ♀; Cradle Vale, Jan, 1923, 2 ♂♂, 2 ♀♀; Wilmot, Jan. 1923, 1 ♂, 1 ♀; Lake Margaret, Feb. 1923, 2 ♂♂, 1 ♀. SOUTH AUSTRALIA: Aldgate, F. E. Wilson, 1 ♂. WESTERN AUSTRALIA: Millstream Station, July 1958, J. A. L. Watson, 2 ♂♂, 3 ♀♀.

PENTANEURA PARVA, sp. nov.

A small pale species with brilliant pruinosity on shoulders; wings with dark macrotrichia occupying most of basal half; legs pale, middle L.R. about 1; abdomen banded, male coxites yellow.

Wing length.—1·75–2·0 mm.

Male.—Head, mouthparts, and antennae yellowish brown, shoulders pruinose, often brilliantly so, bristles pale. *Legs* yellowish white, front L.R. 0·8, middle L.R. 1. *Wings* differ from *levidensis* because the basal half is more or less clothed with dark macrotrichia which are absent from basal and costal cells — this is more apparent in the female; halteres yellow. *Abdomen* pale with basal dark bands on segments 1–5, segments 6–8 dark, hypopygium yellow.

Female.—Resembles male but dark areas of wing much better developed, abdomen mainly dark.

Types.—Holotype ♂ and 1 ♀ and 2 ♂ paratypes, Burpengary, Qld., T. L. Bancroft (BM). Further paratypes: 2 ♂♂, 3 ♀♀, Townsville, Qld., F. H. Taylor (SPHTM).

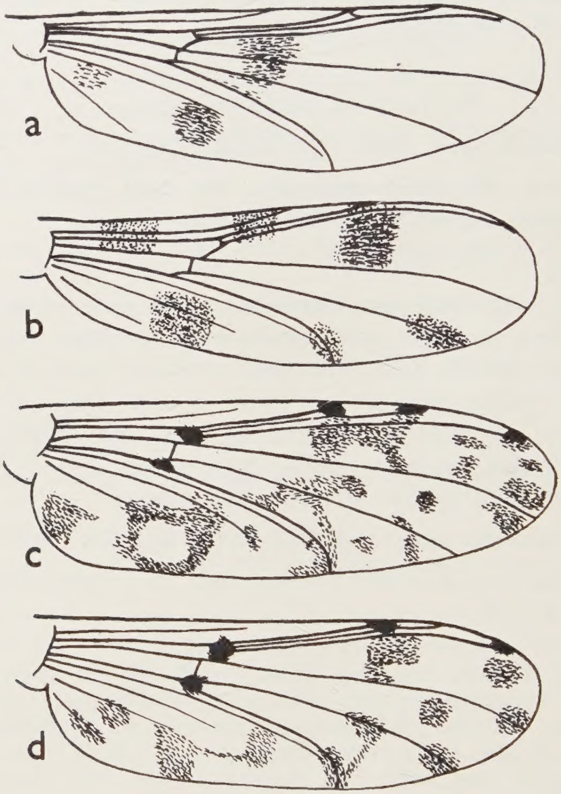

Fig. 1.—Wings of females of *Pentaneura* and *Ablabesmyia*: *a, P. punctipennis; b, P. formulosa; c, A. notabilis; d, A. hilli.*

PENTANEURA PUNCTIPENNIS, sp. nov.

Brown, thorax pruinose between the stripes (along hair lines), legs yellowish, wings with patches of dark macrotrichia more or less across the middle which distinguishes it from other Australian species.

Wing length.—2·5 mm.

Male.—*Head,* mouthparts, and antennae brown, eyes bare, A.R. about 1·5. *Thorax* brown; shoulders, wing bases, and scutellum pale, pruinose along hair lines. *Legs* yellowish, front L.R. 0·8, middle L.R. nearly 1. *Wings* (Fig. 1, *a,* of female) with patches of dark macrotrichia across the middle, those in cell R_5 and anal cell being most conspicuous; halteres yellow. *Abdomen* dark brown, segments 1 5 with pale pruinose bands occupying the apical third.

Female.—Resembles the male, wing spots more conspicuous and anal angle with an extra one.

Types.—Holotype ♂, Black Mountain, A.C.T., 22.viii.1930, A. L. Tonnoir (CSIRO). Paratypes: Colo Vale, N.S.W., 16.x.1956, 1 ♀, W. W. Wirth (USNM); Wilmot, Tas., 8.i.1923, A. L. Tonnoir, 1 ♀ (SPHTM); Euroa, Vic., Sept. 1959, N. Dobrotworsky, 1 ♂ (BM).

PENTANEURA FORMULOSA (Skuse), comb. nov.

Isoplastus formulosus Skuse, 1889, p. 282. Kieffer, 1906, p. 44.

Brown with pale legs, abdominal segments 1–5 of male white with dark basal bands, wings with 6 dark spots, each clothed with dark macrotrichia. The wing pattern is sufficient to distinguish it from other Australian species known to the author.

Wing length.—2 mm.

Male.—*Head,* mouthparts, and antennae brown, A.R. 1·3, eyes bare. *Thorax* brown and slightly pruinose. *Legs* pale yellowish, middle L.R. about 0·8. *Wings* (Fig. 1, *b,* of female) with 6 dark spots each carrying dark macrotrichia, costa slightly produced, halteres yellow. *Abdomen* with segments 1–5 white, each with a basal dark band sometimes occupying as much as one-half of the segment, hypopygium pale.

Female.—Resembles male, wing markings more conspicuous, abdomen more uniformly dark.

Types.—I have seen the cotype series of 6 ♂♂, 8 ♀♀, Berowra, N.S.W. (MM) and I have selected the male marked by Skuse as "♂ type" as the lectotype.

Additional specimen seen.—Narrabeen, N.S.W., Oct. 1956, W. W. Wirth, 1 ♀.

Genus ABLABESMYIA Johannsen

Ablabesmyia Johannsen, 1905, p. 135. Freeman, 1955*c*, p. 35; 1959, p. 399 (as subgenus of *Pentaneura*).

Isoplastus Skuse, 1889, p. 279 (in part). Kieffer, 1906, p. 44.

Tanypus Kieffer, 1917, p. 203.

Pentaneura, group A, Edwards, 1929, p. 288.

Type species *Tipula monilis* Linnaeus, 1758.

Generally similar to *Pentaneura,* but distinguished because wings invariably with pattern of dark macrotrichia, tibiae with 3 or 4 dark rings, prescutellar area well marked and with acrostichal bristles diverging around it, male hypopygium with complex structures basally between coxites.

KEY TO AUSTRALIAN SPECIES OF THE GENUS ABLABESMYIA

Wing with 3 black spots along anterior margin (Fig. 1, *c*) dark pattern more complex .... *notabilis* Skuse

Apex of R_{2+3} lacking a black spot so that anterior margin with only 2 spots (Fig. 1, *d*), pattern simpler .... *hilli,* sp. nov.

ABLABESMYIA NOTABILIS (Skuse), comb. nov.

Isopiastus notabilis Skuse, 1889, p. 280. Kieffer, 1906, p. 44.

Tanypus monilis Kieffer, 1917, p. 203.

Thorax dark with grey pruinose mottling, legs conspicuously black banded, wings clearly marked with patches of dark macrotrichia, costa with 3 black markings at apices of 3 radial veins, abdomen with segments 1–5 banded.

Wing length.—2–3·5 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. about 2. *Thorax* dark brown with grey pruinose mottling. *Legs* white and with well-marked black bands or rings as follows: femora either with 3 or with basal two-thirds and apex dark; tibiae with either 3 or 4 rings, the sub-basal one sometimes being absent; basitarsus with central and apical bands, other tarsal segments mainly dark. *Wings* of female (Fig. 1, *c*) with strongly marked pattern composed of dark spots of dark macrotrichia; black spots present at apices of R_1, R_{2+3}, and R_{4+5}; halteres white. *Abdomen* usually dark with pale bands at apices of segments 1–5, but it may be rather paler.

Female.—Similar to male except for abdomen which is uniformly dark.

Types.—I have seen the cotype series of 3 ♂♂, 1 ♀, Blue Mountains and Sydney, N.S.W. (MM), and I have selected as lectotype a male from Nepean R., near Penrith, Blue Mountains.

Additional specimens seen.—QUEENSLAND: Watten, F. H. Taylor, 1 ♀; Brisbane, A. J. Turner, 1 ♀; Eidsvold, T. L. Bancroft, 2 ♂♂; Burpengary, T. L. Bancroft, 3 ♂♂ (all in SPHTM). NEW SOUTH WALES: Mosman, W. W. Wirth, 3 ♀♀; Colo Vale, Apr. 1957, W. W. Wirth, 2 ♂♂; Griffith, Nov. 1956, W. W. Wirth, 1 ♂; Hornsby, Nov. 1957, D. J. Lee, 2 ♂♂, 6 ♀♀; Careel Bay, Dec. 1957, D. J. Lee, 5 ♀♀; Yass, Sept. 1930, K. English, 2 ♂♂, 2 ♀♀. AUSTRALIAN CAPITAL TERRITORY: Blundell's, A. L. Tonnoir, 1 ♂, 1 ♀. VICTORIA: Millgrove, Feb. 1929, F. E. Wilson, 1 ♂; Ocean Grove, J. Martin, 1 ♂ (BM). TASMANIA: Hobart, Jan. 1923, A. L. Tonnoir, 1 ♂; Wilmot, Jan. 1923, A. L. Tonnoir, 1 ♂, 1 ♀. SOUTH AUSTRALIA: Aldgate, Nov. 1929, F. E. Wilson, 2 ♂♂. WESTERN AUSTRALIA: Pembarton, Nov.–Dec. 1936. K. R. Norris, 1 ♀ (CSIRO); Millstream Station, July 1958, J. A. L. Watson, 2 ♂♂, 3 ♀♀.

ABLABESMYIA HILLI, sp. nov.

Ablabesmyia notabilis Edwards, 1928, p. 60 (not Skuse, 1889, p. 280).

Edwards incorrectly placed Samoan material into *notabilis*. In fact two species occur in Australia, one of which is also found in Samoa and New Guinea.

The present species is very similar to *notabilis* but can be separated by the simpler wing pattern (Fig. 1, *d*), in particular by the single spot at the apex of cell R_5 and by the absence of a dark spot at the apex of R_{2+3}. In addition the length from the apex of R_1 to R_5 is proportionately smaller than in *notabilis*. It seems on the whole to be rather paler and smaller than *notabilis* (wing length 2 mm), but the species in this genus are so variable that this may be individual variation.

Types.—Holotype ♀ and 4 ♀ paratypes, Townsville, Qld., G. F. Hill (BM). Further paratypes: Tambrey Station, W.A., Aug. 1958, J. A. L. Watson, 1 ♀; Government House, Port Moresby, New Guinea, June 1947, Lee and Wharton, 1 ♀ (SPHTM); Apia, Upolu, Samoa, 2 ♀♀ (BM).

Genus ANATOPYNIA Johannsen

Anatopynia Johannsen, 1905, p. 135. Edwards, 1929, p. 297; 1931, p. 239. Freeman, 1955*c*, p. 44; 1959, p. 401.

Macropelopia Thienemann, 1916, p. 497.

Tanypus Skuse, 1889, p. 278 (not Meigen, 1803).

Wing membrane clothed with macrotrichia; costa strongly produced; R_2 present, distinct, and clearly connected to R_3; posterior fork just basal to true base of M_{3+4}, as in *Pentaneura*; antennae of female 15-segmented; pulvilli absent in all Australian species known to author (present in some New Zealand species).

I have been able to recognize five Australian species all falling into Edwards' (1929) group B (= *Macropelopia* Thienemann).

KEY TO AUSTRALIAN SPECIES OF THE GENUS ANATOPYNIA

1. Tibiae dark, with a central white band and thickly clothed with hairs, wings as in Figure 2, *a* .... *pennipes*, sp. nov.
   Tibiae dark at apex only or entirely pale, not thickly clothed with hairs, wings with a different pattern 2
2. Wing markings confined to dark area at crossveins, legs almost entirely yellow .... *pallipes*, sp. nov.
   Wings with at least some dark markings distal to crossveins, legs distinctly darkened at apices of femora 3
3. Wings with transverse row of 3 strongly marked dark-haired spots at level of apex of R_1 (Fig. 2, *b*) .... *maculosa*, sp. nov.
   Wing markings in apical half not strongly marked and not in form of a tranverse row 4
4. Apex of wing lacking dark macrotrichia .... *dalyupensis*, sp. nov.
   Apex of wing clothed with dark macrotrichia .... *mastersi* Skuse

ANATOPYNIA PENNIPES, sp. nov.

A very distinctive and striking species, easily recognized by the banded and thickly haired legs, by the broad-banded wing pattern, and the yellow-patterned abdomen.

Wing length.—2·25 mm.

Male.—*Head* and antennae brown, mouthparts yellow, A.R. about 1·7. *Thorax* polished dark brown or blackish, shoulders paler, postnotum bare, prothorax pruinose. *Legs*: femora clubbed, yellow with apical quarter blackish, and thickly clothed with black hairs as long as diameter of segment, posterior femora with additional central brown band; tibiae dark brown and with a central yellow band, dark parts thickly clothed with long black hairs; tarsi white, basitarsus with apical third black, segments 2–3 black tipped, 4 and 5 wholly dark; L.R. 0·75, anterior tarsi not bearded, pulvilli absent. *Wings* with dark macrotrichia arranged in 2 bands, a broad apical one and a smaller basal one which broadens in anal cell (Fig. 2, *a* of female); halteres yellow. *Abdomen* with segments 1 and 2 yellow, 3 black with yellow apical ring, 4 yellow with black basal ring, 5–7 black and with dorsal tufts of black hairs, 8 brown, hypopygium dark.

Female.—Similar to male.

Types.—Holotype ♂ and 1 ♂ and 2 ♀ paratypes, Burpengary, Qld., T. L. Bancroft (BM).

ANATOPYNIA PALLIPES, sp. nov.

Thorax reddish brown, often slightly shining, pruinosity may be slight; legs yellow, faintly darker above knees; wings slightly darkened at crossveins only; abdomen pale, in male with subapical dark rings to the segments. Distinguished from other species by the plain wings, pale legs, and generally pale coloration.

Wing length.—3·5 mm.

Male.—*Head*, mouthparts, and antennae yellowish brown, A.R. 1·75. *Thorax* reddish brown, stripes hardly distinguishable, mesonotum sometimes slightly shining, pruinosity may be faint or give a general greyish tinge. *Legs* yellow, femora slightly darkened above knees, apex of tibiae also reddish, L.R. 0·75, femora not clubbed, hairs normal. *Wings* practically without markings or patches of dark macrotrichia; such dark markings as are present confined to staining of membrane around crossveins; halteres white. *Abdomen* mainly yellowish white; segments 2–5 with subapical dark rings of variable width, segments 6–8 and hypopygium largely dark.

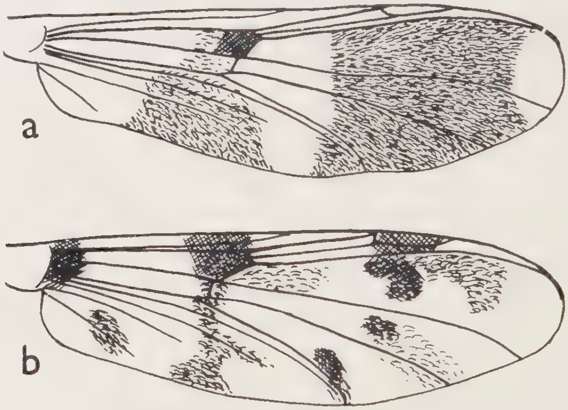

Fig. 2.—Wings of females of *Anatopynia*: *a*, *A*. *pennipes*; *b*, *A*. *maculosa*.

Female.—Resembles male, abdomen of a more uniform pale brown colour.

Types.—Holotype ♂, Geeveston, Tas., 7.xii.1922, A. L. Tonnoir (SPHTM). Paratypes: TASMANIA: Burnie, 25.x.1922, 2 ♂♂, 1 ♀; National Park, 16.xii.1922, 1 ♂; Wilmot, 8.i.1923, 1 ♂; Cradle Valley, 24.i.1923, 1 ♂ (all coll. by A. L. Tonnoir). NEW SOUTH WALES: Megalong Valley, Oct. 1930, F. E. Wilson, 1 ♂.

ANATOPYNIA MACULOSA, sp. nov.

General colour dark, though variable, thorax with grey pruinosity, wing pattern always with a transverse row of 3 dark spots at level of apex of *R*; femora and tibiae dark at apices; abdominal segments 2–5 with apical dark markings in male.

Wing length.—2·8–4·0 mm.

Male.—Head, antennae, and mouthparts brown, A.R. 1·8–2·0. *Thorax* brown or dark brown and pruinose, sometimes heavily so, especially between stripes; lighter-coloured specimens show much less pruinosity. *Legs* yellowish or brownish, apices of femora and tibiae darkened; anterior tarsus with thin beard, L.R. 0·6, pulvilli absent. *Wings* (Fig. 2, *b*, of female) often heavily patterned with staining and patches of dark macrotrichia, but lighter specimens show a reduction of the dark areas although the subapical transverse row of 3 patches of dark macrotrichia is always present; halteres yellow. *Abdomen* usually mainly dark, segments 1–5 with basal pale rings, but pale specimens may have these segments mainly yellow with apical dark rings.

Female.—Resembles male, pattern usually more strongly developed.

Types.—Holotype ♂ and paratype ♂, Lake Margaret, Tas., 3.ii.1923, A. L. Tonnoir (SPHTM). Further paratypes: TASMANIA: Launceston, Sept. 1916, F. M. Littler, 1 ♀ (SPHTM); Burnie, 26.x.1922, 2 ♀♀; St. Patrick R., 30.x.1922, 1 ♂, 1 ♀; Cradle Valley, Jan. 1923, 3 ♀♀ (all coll. by A. L. Tonnoir). VICTORIA: Millgrove, Sept. 1929, F. E. Wilson, 1 ♂; Walhalla, Apr. 1930, F. E. Wilson, 1 ♂; N. Melbourne, Sept. 1939, J. W. Raft, 1 ♀ (CSIRO). NEW SOUTH WALES: Yass, Aug. 1930, K. English, 2 ♀♀; Tallong, F. H. Taylor, 1 ♂, 1 ♀.

ANATOPYNIA MASTERSI (Skuse), comb. nov.

Tanypus mastersi Skuse, 1889, p. 278.

Ablabesmyia mastersi Kieffer, 1906, p. 43.

Thorax brown, slightly pruinose, legs dark at apices of segments, wings with transverse dark-haired area at crossveins and with 3 other dark patches at apex and at tips of M_{3+4} and Cu_1, male abdomen with dark bands in apical halves of segments.

Wing length.—3–3·5 mm.

Male.—Head, mouthparts, and antennae brownish, A.R. 1·2. *Thorax* brownish or yellowish brown, shoulders paler, slightly pruinose. *Legs* pale, apices of femora, tibiae, and tarsal segments darkened; L.R. 0·6, anterior tarsus slightly bearded, pulvilli absent. *Wings* with dark shaded area at crossveins, not as extensive as in female, and with dark haired patches at wing apex and at apices of M_{3+4} and Cu_1; halteres yellowish. *Abdomen* yellow, segments 2–7 with a dark band in apical half.

Female.—Resembles male but, as usual, tends to be darker and with better-developed markings; central wing shade reaches right across wing as a transverse band, and other dark areas more obvious.

Type.—Holotype ♀, Lawson, Blue Mountains, N.S.W. (MM).

Additional specimens seen.—NEW SOUTH WALES: Fitzroy Falls, Nov. 1937 and Oct. 1938, A. L. Tonnoir, 1 ♂, 1 ♀. AUSTRALIAN CAPITAL TERRITORY: Blundell's, 22.x.1938, A. L. Tonnoir, 1 ♀; Shannon Creek, 13.xi.1938, A. L. Tonnoir, 1 ♂. Two specimens retained in BM, remainder returned to CSIRO.

ANATOPYNIA DALYUPENSIS, sp. nov.

Thorax dark with brown stripes and heavy grey pruinosity between; distinct wing markings at crossveins and near apex of *Cu*, faint ones in cell R_5 and M_2; abdomen with pale bands apically on segments 1–7.

Wing length.—3 mm.

Male.—*Head*, mouthparts, and antennae dark brown or blackish, A.R. 1·8. *Thorax* with separate brown stripes, the intervening strips, shoulders, lateral margins, and prescutellar area dark and with heavy grey pruinosity; scutellum grey, remainder of thorax dark. *Legs* yellowish brown, femora strongly darkened in apical third, tibiae dark at base and apex; traces of tarsal beard present, L.R. 1·6. *Wings* with definite dark areas at crossveins and above apex of Cu_1 and with vague indications of areas of darker macrotrichia near centres of cells R_5 and M_2; halteres yellow. *Abdomen* mainly dark, but segments 1–7 have vague pale bands placed apically.

Female.—Similar to, but darker than, male; dark wing hairs more extensive.

Types.—Holotype ♂, Dalyup River Springs, W.A., larva collected 3.iv.1958, emerged 7.v.1958, D. Edward (WAM). Paratypes: WESTERN AUSTRALIA: 11 miles N. of Muchea, 26.vi.1958, D. Edward, 1 ♂ (BM); Shark Lake, N. of Esperance, Dec. 1959, D. Edward, 1 ♀ (BM).

Genus COELOTANYPUS Kieffer

Coelotanypus Kieffer, 1913*a*, p. 154. Edwards, 1931, p. 237. Freeman, 1955*c*, p. 50.

Type species *Procladius humeralis* Loew, 1866.

Wing membrane bare, posterior fork either opposite base of M_{3+4} (*m-cu* of previous authors) or stem at most one-sixth length of Cu_1; vein R_2 present, rather long, and almost parallel to R_3 but not distinctly connected to it. Mesonotum usually lacking acrostichal hairs, but they are occasionally present; centre of mesonotum with oval tubercle as in *Tanypus*. Fourth tarsal segment cordiform as in *Clinotanypus*, posterior tibia with comb-like row of setae on inner side at apex.

Although very similar to *Clinotanypus* this genus is best kept separate because of the very short stem to the posterior fork and the presence of a mid-thoracic tubercle. Most of the described species are to be found in South America, but others occur in North America and I have described a single one from West Africa.

COELOTANYPUS WIRTHI, sp. nov.

Thorax black with a large milk-white spot covering shoulders, lateral margin, and upper half of pleuron; legs dark, tibiae and basitarsi mainly pale; wings with crossveins clouded; abdomen conspicuously banded with black and yellowish white.

Wing length.—2·4 mm.

Male.—*Head* white, mouthparts and antennae dark brown, A.R. about 2. *Thorax* black with slight pruinosity in certain lights, upper half of pleuron, shoulder, and lateral mesonotal margin anterior to wing base covered by a large milk-white spot; central mesonotal tubercle present, acrostichal bristles absent. *Legs* mainly blackish or very dark brown; trochanters and bases of femora yellowish; tibiae of front legs yellow with apical quarter black, those of other legs with basal and apical quarters black; basitarsi yellowish white with apical quarter dark; anterior tarsi not bearded, L.R. about 0·8. *Wings* with brown cloud over crossveins; stem of posterior fork very short, about half as long as true base of M_{3+4}; halteres yellow. *Abdomen* with segments 1 and 2 wholly yellowish white; segment 3 black with apical third yellowish white; segment 4 yellowish white with narrow basal black band; segment 5 wholly black; segment 6 black on basal third; segments 7 and 8 wholly black, hypopygium white.

Type.—Holotype ♂, Narrabeen Lagoon, N.S.W., Jan. 1957, W. W. Wirth (USNM).

Genus CLINOTANYPUS Kieffer

Clinotanypus Kieffer, 1913*c*, p. 157. Edwards, 1929, p. 302. Freeman, 1955*c*, p. 52.

Wings bare, costa produced, R_2 similar to *Coelotanypus*, posterior fork distal to true base of M_{3+4}, the stem being about one-half length of Cu_1. Female antenna with 14 segments. Fourth tarsal segment bilobed and cordiform, pulvilli absent; posterior tibia with well-formed comb-like row of setae at apex on inner side. Mesonotal tubercle usually absent but present in one African species.

The single Australian species known to me appears to be the same as *C. crux* (Wiedemann) from the eastern part of India.

CLINOTANYPUS CRUX (Wiedemann), comb. nov.

Tanypus crux Wiedemann, 1824, p. 10. Kieffer, 1906, p. 41.

Tanypus pardalis Doleschall, 1856, p. 405. Kieffer, 1906, p. 42 (? syn. of *crux*).

Tanypus ornatus Doleschall, 1857, p. 385. Kieffer, 1906, p. 42 (? syn. of *crux*).

Clinotanypus australiensis Kieffer, 1926, p. 104 (syn. nov.).

Male yellow with conspicuous black thoracic pattern including large dull black spots on shoulders and in front of wing base; legs yellow with black knees; wing marking including a pale spot; abdomen yellow with black bands. Female not definitely known, but specimens I am including in the species are bulky, reddish insects without the 4 dull black spots but with similar wings and legs to the male.

Wing length.—2·25–3·0 mm.

Male.—*Head* and mouthparts yellow, pedicel dark brown, flagellum yellowish or brown, plumes dark subapically, A.R. 3·5. *Thorax* shining yellowish or whitish, stripes black or dark brown, anterior ones distinctly separated by a longitudinal yellow stripe, each one sometimes divided transversely as well, hence forming a yellow cross; lateral margins anterior to wing bases and shoulders each with a large oval dull black spot which overlies both stripe and pale area; prescutellar area darkened posteriorly, sternopleuron and postnotum blackish, scutellum pale. *Legs* yellow or whitish, apices of femora and bases of tibiae darkened, apices of tibiae and 4th and 5th tarsal segments brown; anterior tarsi with sparse beard, L.R. 0·8. *Wings* with brown subapical transverse band at level of apical half of R_1, more or less joined along anterior margin and through cell M_2 with clouding over crossveins, so that whole effect is of a broad band with a clear area in the middle; halteres pale. *Abdomen* yellow with black bands of variable width on segments 2–8; bands on segments 2–5 placed centrally, on segments 6–8 more apically.

Female.—The female has never been described and I have seen no specimens definitely associated with males. Judging from other species of the genus, especially the African *claripennis* Kieffer, the females may not show the male pattern, and therefore, three specimens from Queensland may well belong here. They are bulky insects, reddish brown with indications of dark markings on thorax but without the 4 large dull black spots of the male; wings and legs as in male, abdomen fairly uniformly dark brown in dried specimens.

The three species *crux, pardalis,* and *ornatus* are easily recognized from the original descriptions and figures and are all obviously the same species; *crux* was described from "India or.", and the other two from Java. Through the kindness of Dr. W. Hennig, I have been able to borrow the type male of *australiensis* from Deutsches Entomologisches Institut, Berlin, and find that it, again, belongs to the same species (type locality Palmerston, Qld.).

Additional specimens seen.—INDIA: Upper Assam, Dibrugarh, Aug. 1922, P. J. Barraud, 33 ♂♂ (BM). SIAM: Klong Rang Sit, July 1929, W. R. S. Ladell, 1 ♂ (BM). SUMATRA: Fort de Kock, E. Jacobson, 4 ♂♂ (BM). QUEENSLAND: Watten, F. H. Taylor, 2 ♀♀; Townsville, F. H. Taylor, 1 ♀. NEW SOUTH WALES: Far N. Coast, F. H. Taylor, 1 ♀.

Genus COELOPYNIA, gen. nov.

Type and only known species *Coelopynia pruinosa,* sp. nov.

Antennae of female 14-segmented. Pronotum large, the two halves meeting and with a V-shaped emargination; acrostichal bristles present, mesonotal tubercle absent, postnotum bare. Fourth tarsal segment on all legs bell-shaped or cordiform as in *Coelotanypus* and *Clinotanypus*; 5th segment laterally compressed and somewhat produced at the apex in the only known species so that claws seem to be slightly subapical; pulvilli absent; posterior tibia with well-formed inner comb at apex; tarsal spurs present. Wing membrane without macrotrichia, venation as in *Anatopynia,* i.e. R_2 short and distinctly connected to R_3, costa strongly produced, base of M_{3+4} connected directly on to posterior fork.

The single species placed here shows a curious combination of the wing characters of *Anatopynia* with the leg features of *Clinotanypus* and *Coelotanypus.* The cordiform 4th tarsal segment and the presence of a posterior tibial comb place the species firmly into one or other of the two latter genera and it could be argued that the basal movement of the posterior fork is foreshadowed in species of *Coelotanypus* such as *africanus* Freeman. However, the additional character of the shortness of R_2 which is quite definitely fused to R_3, combined with absence of mesonotal tubercle suggests that the more appropriate action is to place it in a separate genus.

COELOPYNIA PRUINOSA, sp. nov.

Thorax pruinose, legs yellow, all segments black-tipped, wings without markings except at crossveins, abdomen banded in male.

Wing length.—2·3–4·2 mm.

Male.—*Head* dark and with grey pruinosity, mouthparts brown, antennae brown, scape blackish, A.R. 2·0. *Thorax* overlaid with grey dusting which obscures underlying pattern, but background yellowish brown, stripes dark and separate, sternopleuron and postnotum dark; bristles short as in *Coelotanypus* spp. *Legs* yellowish, extreme apices of all segments dark, anterior tarsi perhaps darker, tarsal beard present, rather thin and long, L.R. 0·6. *Wings* unmarked except for slight cloud at crossveins; halteres whitish. *Abdomen* yellow with dark bands on segments 2–7, segment 8 and hypopygium largely dark; the dark bands are placed more or less basally and are progressively wider, that on segment 2 occupying nearly two-thirds of the segment, that on 7 occupying all except the margin; bands not completely basal, so that the pale areas cover incisures.

Female.—Resembles male in colour, although thoracic stripes not completely dark in paler specimens; in these specimens stripes black in anterior parts and reddish elsewhere; Tasmanian specimens exceptionally large and dark.

Types.—Holotype ♂, Linga, Vic., Oct. 1922, F. E. Wilson (SAM).* Paratypes: QUEENSLAND: Townsville, Jan.-Feb. 1959, A. K. O'Gower, 1 ♂, 3 ♀♀ (SPHTM). NEW SOUTH WALES: Narrabri, 20.v.1924, 1 ♀ (BM); Hornsby, Nov. 1957, D. J. Lee, 1 ♂. AUSTRALIAN CAPITAL TERRITORY: Black Mountain, Dec. 1953, 1 ♀, Dec. 1954, 1 ♀, Nov. 1958, 2 ♀♀, I. F. B. Common (CSIRO); Canberra, Nov. 1958, K. L. Taylor, 1 ♀ (CSIRO). VICTORIA: Melbourne, 14.xi.1923, 1 ♀ (SPHTM). TASMANIA: Great Lake, 1 ♀ (SPHTM).

Genus PROCLADIUS Skuse

Procladius Skuse, 1889, p. 283. Edwards, 1929, p. 300. Freeman, 1955*c*, p. 56.
Trichotanypus Kieffer, 1917, p. 202 (not Kieffer, 1906).
Psilotanypus Kieffer, 1906, p. 34.

Type species *Procladius paludicola* Skuse, 1889.

Wings hairy or bare, costa produced, R_2 present, very distinct and clearly connected to R_3, stem of posterior fork more than half as long as Cu_1. Female antenna with 13–14 segments. Mesonotal tubercle absent. Fourth tarsal segment on all legs cylindrical, pulvilli absent.

Three Australian species are known, all belonging to the hairy-winged division (*Procladius*, s.s.) although the macrotrichia are not always very obvious and might suggest that the bare-winged subgenus (*Psilotanypus*) was not valid.

KEY TO AUSTRALIAN SPECIES OF THE GENUS PROCLADIUS

1. Thorax shining black, not pruinose; abdomen of male with milk-white markings on segments 2, 4, and 8; thorax of good specimens with erect scales near the centre; wings with vague clouds .... *squamifer*, sp. nov.
   Thorax pruinose and not shining; abdomen with a pale band on each segment; thorax without scales 2
2. Wings with distinct dark markings in form of 2 bands or transverse rows of spots; female antenna 13-segmented, wing length 1·5–2·0 mm .... *paludicola* Skuse
   Wing markings present only at crossveins and sometimes in anal cell; female antenna with 14 segments; wing length 3–3·25 mm .... *villosimanus* Kieffer

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* South Australian Museum, Adelaide.

PROCLADIUS PALUDICOLA Skuse

Procladius paludicola Skuse, 1889, p. 284. Kieffer, 1906, p. 39.
Procladius pictipennis Skuse, 1889, p. 285. Kieffer, 1906, p. 39 (syn. nov.).
Procladius pentastictus Kieffer, 1917, p. 201 (syn. nov.).
? *Trichotanypus subglaber* Kieffer, 1917, p. 202.

A small species, thorax with grey pruinosity on stripes, not shining; female antenna 13-segmented; abdomen of male with pale bands on each segment; wings clearly marked with 2 transverse dark bands which may be reduced to discrete spots but which can always be distinguished.

P. paludicola was described by Skuse from specimens which he said had black pleura and unmarked wings bearing macrotrichia at the apex, whilst *pictipennis* had a pale pleural patch, patterned wings, and no macrotrichia. A modern microscope shows up both the wing pattern and macrotrichia in type specimens of both species and, in addition, shows the presence of a spot over *Cu* which is the main difference given by Kieffer in his description of *pentastictus*. All species have a pale area on the pleuron. There is, therefore, nothing to prevent the last two from being considered as synonyms of the first. *T. subglaber* almost certainly belongs here as well, but in the absence of type material it is preferable to treat the synonymy as doubtful.

Wing length.—1·5–2·0 mm.

Male.—*Head* whitish on face, brown behind, mouthparts brown, antennae dark brown, A.R. 1·5. *Thorax* mostly dark grey; stripes fused and with grey pruinosity; shoulders, lateral margins, and upper halves of pleura mainly yellowish white, scutellum pale brown. *Legs* pale yellow, femora and tibiae dark at tips, last 3 segments of tarsi dark, L.R. 0·75, tarsal beard absent. *Wings* with a few macrotrichia on the membrane at the extreme apex, sometimes practically absent or difficult to see; dark markings present as 2 bands or broken bands composed of spots, one over crossveins and in anal cell, the other more curved and extending from R_2 to Cu_1; outer band frequently broken into individual spots, 2 in cell R_5, 1 in cell M_2, and another over Cu_1; anal angle also sometimes clouded or partially clouded. Halteres white. *Abdomen* dark with pale bands at apices of segments, these bands especially well developed on segments 2–4.

Female.—Resembles male but wing pattern more conspicuous and macrotrichia more easily visible and present not only at apex but also along margin and in anal cell; antenna with 13 segments.

Types.—I have seen the type material of Skuse's species and have selected as lectotype of *paludicola* the male marked as "type ♂" by Skuse. Type locality of *paludicola*, Hexham Swamps, near Newcastle, N.S.W.; of *pictipennis*, Lawson, Blue Mountains, N.S.W.; of *pentastictus* and *subglaber*, Botanic Gardens, Sydney. The types of the first two are in the Macleay Museum, those of the last two were in the Hungarian National Museum but are now lost.

Additional specimens seen.—QUEENSLAND: Townsville, F. H. Taylor, 3 ♂♂, 2 ♀♀; Burpengary, T. L. Bancroft, 1 ♀. NEW SOUTH WALES: Trangie, 1 ♂, 3 ♀♀ (SPHTM); Careel Bay, 1 ♀, Hornsby, 2 ♂♂, 7 ♀♀, D. J. Lee; Warriewood, 1 ♂, 2 ♀♀, Dee Why, 1 ♀, Narrabeen, 1 ♂, W. W. Wirth; Sydney, 1 ♂, 1 ♀ (SPHTM); Yass, 1 ♂, 1 ♀, K. English.

AUSTRALIAN CAPITAL TERRITORY: Red Hill, March 1930, A. L. Tonnoir, 5 ♂♂, 8 ♀♀. VICTORIA: Melbourne, 1 ♂ (NM); Kororoit Creek, 5 ♂♂, 1 ♀ (BM, NM); Nyah, 7 ♂♂, 3 ♀♀, J. Martin (BM, NM). TASMANIA: Hobart, 1 ♀, Wilmot, 1 ♂, 3 ♀♀, Cradle Vale, 1 ♀, A. L. Tonnoir. SOUTH AUSTRALIA: Aldgate, F. E. Wilson, 1 ♂, 1 ♀. WESTERN AUSTRALIA: Lake Grace, 1 ♂, Esperance, 1 ♂, Gin-Gin Brook E., 1 ♂, 1 ♀, D. Edward; Tambrey Station, J. A. L. Watson, 1 ♂, 6 ♀♀; Perth, Nicholson, 1 ♀ (SPHTM).

PROCLADIUS VILLOSIMANUS Kieffer

Procladius villosimanus Kieffer, 1917, p. 202.

? Procladius australiensis ? and var. *bipunctatus* Kieffer, 1917, pp. 200–1.

This species resembles a larger edition of *paludicola*, being similar in colour, structure, and trichiation of the wings. It differs (*a*) in the greater wing length which is 3–3·25 mm; (*b*) in the absence of wing markings, except for a dark cloud at crossveins and a vague darkening which is sometimes visible in the anal cell; (*c*) in the presence of a short beard on the front tarsus of the male; and (*d*) by the female antenna having 14 distinct segments. These differences seem sufficient to treat it as a distinct species.

The species can be identified without difficulty from Kieffer's description. It is probable that his *P. australiensis* also refers to this species but he definitely mentions the absence of male tarsal beard and that the female antennae have only 13 segments, so it is preferable not to synonymize them until adequate material is available from the type locality.

Types.—The type series of both species were in the Hungarian National Museum and are now lost (type localities of both: Botanic Gardens, Sydney).

Specimens seen.—NEW SOUTH WALES: Far North Coast, F. H. Taylor, 1 ♂, 2 ♀♀. AUSTRALIAN CAPITAL TERRITORY: Black Mountain, May 1960, I. F. B. Common, 1 ♀ (CSIRO). VICTORIA: Bogong Plains, Jan. 1928, 1 ♀, Cheltenham, May 1928, 1 ♂, F. E. Wilson; Mt. Sturgeon, Aug. 1953, A. Neboiss, 1 ♀ (NM); Ocean Grove, J. Martin, 5 ♂♂, 3 ♀♀ (BM, NM); Mooroopna, M. F. Day 2 ♀♀ (CSIRO). TASMANIA: St. Patrick R., Oct. 1922, 1 ♀, Mt. Field, Dec. 1922, 1 ♂, 1 ♀, Advent Bay, Dec. 1922, 1 ♀, 4 ♀♀, A. L. Tonnoir. SOUTH AUSTRALIA: Botanic Gardens, Nov. 1939, W. B. Hitchcock, 1 ♂ (NM); Pt. Lincoln, Lea, 1 ♂ (NM). WESTERN AUSTRALIA: Crawley, July 1934, K. R. Norris (CSIRO); Lake Monger, Oct. 1956, D. H. Edward, 4 ♂♂, 4 ♀♀.

PROCLADIUS SQUAMIFER, sp. nov.

Thorax black and shining, pleura milk-white on upper half, in good specimens there is a row of 3–4 erect scales at the middle of the scutum; wings with more macrotrichia than in the other two species, veins dark-seamed; abdomen in both sexes with milk-white markings on segments 2, 4, and 8.

Wing length.—2–2·3 mm.

Male.—*Head* mainly brown, paler on face and frons, A.R. about 1·6. *Thorax* mainly shining black, upper half of pleuron milk-white, in good specimens there is a row of 3–4 erect scales at the centre of the scutum, but these are usually abraded. *Legs* brown, beard absent, L.R. 1·6. *Wings* brown tinged around crossveins and with a slight brown seaming of other veins; macrotrichia present at apex, in anal cell and along centres of cells R_5 and M_2, fork cell with a few at margin; halteres dark with milk-white knobs. *Abdomen* black, segments 2, 4, and 8 with apical milk-white markings, hypopygium black.

Female.—With paler head than the male, antennae with 13 segments, macrotrichia rather denser.

Types.—Holotype ♂, Sydney, F. H. Taylor (SPHTM). Paratypes: NEW SOUTH WALES: Dee Why, S. Creek, Sept. 1956, W. W. Wirth, 1 ♂. AUSTRALIAN CAPITAL TERRITORY: Blundell's, Jan. 1930, A. L. Tonnoir, 2 ♂ ♂. VICTORIA: Werribee Gorge, March 1929, F. E. Wilson, 2 ♀ ♀. TASMANIA: Eaglehawk Neck, Nov. 1922, 3 ♂ ♂, 6 ♀ ♀, Cradle Vale, Jan. 1923, 1 ♀, Lake Margaret, Feb. 1923, 3 ♂ ♂, A. L. Tonnoir.

Subfamily **PODONOMINAE**

The members of this subfamily resemble at first sight species of Tanypodinae and similarly have the true base of M_{3+4} developed (*m-cu* of previous authors). They can be separated from the Tanypodinae because (1) R_{2+3} is completely absent even though R_1 and R_{4+5} are well separated; (2) the postnotum is short and evenly rounded and has no trace of the median furrow; (3) at rest the wings are superposed over the back as in the Ceratopogonidae.

Four species of the subfamily are known to me from Australia, all belonging to the genus *Podonomus*.

Genus PODONOMUS Philippi

Podonomus Philippi, 1865, p. 691. Edwards, 1931, p. 252. Wirth, 1952*a*, p. 93.

Eyes reniform, without distinct dorsal narrow portions; antennae of male more or less plumose and with 15 segments, of female with 10–14 segments. Thorax with pronotum much reduced, not visible dorsally. Wings with R_1 simple in male but usually swollen at apex in female; R_{4+5} often widely separated from R_1; costa produced; true base of M_{3+4} a little beyond posterior fork.

The species that have been placed in this genus seem at first sight to be heterogeneous, as was pointed out by Edwards. There are, however, so many different combinations of the various characters in different species that it is difficult to decide which, if any, of the possible groupings deserve generic or subgeneric status. It is not improbable that a study of the early stages might help, but for the present I am retaining them all in the one genus.

An interesting feature is the wide distribution of two species: *P. kiefferi* seems to be virtually world wide, whilst some specimens I have examined from Australia seem to be inseparable from the Argentinian species *muticus* Edwards.

KEY TO AUSTRALIAN SPECIES OF THE GENUS PODONOMUS

1. R_{4+5} nearly straight, cell R_1 wide (Fig. 3, *e*), eyes pubescent 2
   R_{4+5} curved, cell R_1 narrow, eyes bare 3
2. Wings with macrotrichia on the membrane .... *? muticus* Edwards
   Wings bare .... *wirthi*, sp. nov.
3. Antennae of female with segments almost globular, male types with fork branches short (Fig. 3, *a*) .... *kiefferi* Garrett
   Antennal segments of female cylindrical, styles with fork branches long (Fig. 3, *b*) .... *tasmaniae*, sp. nov.

PODONOMUS KIEFFERI (Garrett)

Paratanypus kiefferi Garrett, 1925, p. 8.
Podonomus peregrinus Edwards, 1929, p. 296; 1931, p. 256.
Podonomus kiefferi Edwards, 1937, p. 101. Wirth, 1952*a*, p. 94.

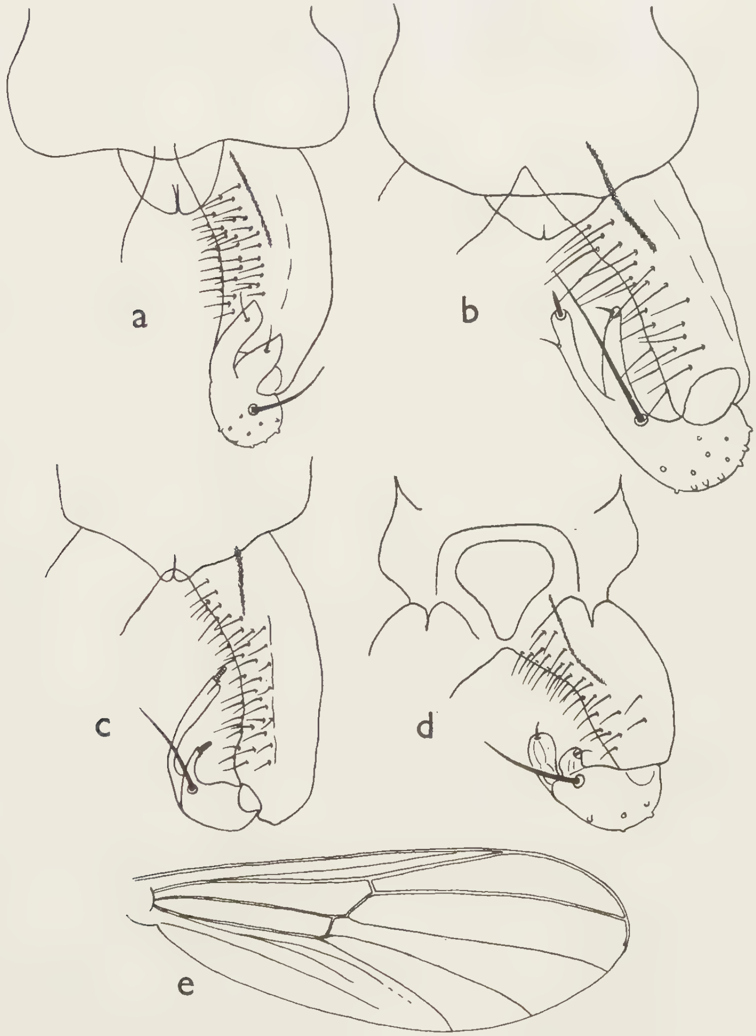

Fig. 3.—Male hypopygia and wing of *Podonomus*: *a, P. kiefferi; b, P. tasmaniae; c, P. ?muticus; d, P. wirthi; e, P. wirthi,* ♂.

Dark brown, mesonotal hairs yellowish and conspicuous, eyes bare, A.R. about 0·5, wings densely hairy, cell R_1 narrow, hairs present in both basal cells, squama fringed. A very widely distributed species which has been recorded from Argentina and the Holarctic Region and with a similar, if not identical, species from New Zealand.

Wing length.—1·7–2·5 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. about 0·5, eyes bare. *Thorax* dark brown, hairs yellowish and conspicuous, hair rows in broad stripes and with plenty of hair on shoulders and along lateral margins. *Legs* brown and with conspicuous long hairs, L.R. about 0·6, 4th tarsal segment rather shorter than 5th. *Wings* densely hairy all over membrane and in all cells, squama fringed; R_{4+5} curved so that cell R_1 narrow, costa produced, remainder of venation similar to *wirthi* (Fig. 3, *e*); halteres dark. *Abdomen* dark brown; hypopygium (Fig. 3, *a*) with style bifid, basal part with clothing hairs (only bases of these are shown).

Female.—Similar to male; antennae 12-segmented, segments globular; R_1 evenly enlarged towards apex.

Specimens seen from Australia.—TASMANIA: Mt. Wellington, 1 ♂, Fern Tree, 1 ♀, Nov. 1922, A. L. Tonnoir.

PODONOMUS TASMANIAE, sp. nov.

A brown species extremely similar to *P. kiefferi* from which the male can be separated by the structure of the styles (Fig. 3, *b*) which are longer and with deeper branches to the forks, the spines of which are stronger and nearer to the apices. The female differs in the antennal structure, the segments being elongate and cylindrical, each about 3–4 times as long as wide; antennae with 12 segments.

Types.—Holotype ♂ and 1 ♀ paratype, Zeehan, Tas., Feb. 1923, A. L. Tonnoir (holotype returned to SPHTM, paratype in BM).

PODONOMUS WIRTHI, sp. nov.

A small species, eyes pubescent, A.R. about 0·25, body dark, wings bare, radial cell extremely wide, squama bare, styles as in Figure 3, *d*. In general appearance, venation, and in possession of pubescent eyes it is very similar to *P. simplex* Edwards from S. America, but it is easily separated by the quite different, forked styles.

Wing length.—1·0 mm.

Male.—*Head* brown, antennae paler; eyes densely pubescent, antennae with last 2 segments short so that A.R. is only about 0·25, apical segment with short hairs only. *Thorax* brown, somewhat pruinose, acrostichal and dorsocentral bristles uniserial, thorax not obviously hairy, fairly strongly produced over head. *Legs* brown, tarsal segments rather short, L.R. about 0·75, pulvilli absent. *Wings* with strong microtrichia but without macrotrichia on the membrane, squama bare, radial cell extremely wide (Fig. 3, *e*); halteres pale brown. *Abdomen* brown, hypopygium (Fig. 3, *d*) with conical 9th tergite; style with a few clothing hairs on basal part, forked at apex, and with a long strong bristle.

Female.—Similar to male; antennae 14-segmented, but not as long as in *simplex*, R_1 hardly swollen at apex.

Types.—Holotype ♂ and 2 ♂ and 3 ♀ paratypes, also specimens in spirit, Middle Creek, Narrabeen, N.S.W. 16.ix.1956, W. W. Wirth (USNM).

PODONOMUS ? MUTICUS Edwards

Podonomus muticus Edwards, 1931, p. 262.

Dark brownish, eyes pubescent, wings with macrotrichia on membrane, cell R_1 wide, squama with fringe, male styles deeply bifid (Fig. 3, *c*), apical antennal segments of male not elongate at all. The three Australian specimens can only be separated from the type of this South American species by the shorter apical antennal segments in the male; all other features of wings and genitalia are identical. As the antennal character is not reliable I am treating them as probably belonging to the same species.

Wing length.—1·5–2·2 mm.

Male.—*Head*, mouthparts, and antennae brown, eyes pubescent, all segments of antennal flagellum of equal size (in *muticus* holotype segment 14 is equal to 12–13 together). *Thorax* dark brown, slightly pruinose or dusted, rather bare in appearance but both dorsocentrals and acrostichals present, scutellum and wing bases paler. *Legs* brown, L.R. about 0·7, spurs short. *Wings* evenly clothed with macrotrichia, except in upper basal cell; venation similar to *wirthi*, cell R_1 not quite as wide, squama fringed; halteres pale. *Abdomen* brown; hypopygium (Fig. 3, *c*) with narrow coxite, style deeply bifid, each branch flattened and with a stout spine, basal part bare of clothing setae.

Female.—Similar to male; upper basal cell with a few hairs at apex, R_1 hardly swollen at apex, antennae probably 14-segmented.

Type.—Holotype ♂, Lake Gutierrez, Argentina (BM).

Specimens seen.—NEW SOUTH WALES: Yass, Aug.–Sept. 1930, K. English, 2 ♀♀; Fitzroy Falls, Oct. 1938, A. L. Tonnoir, 2 ♀♀ (CSIRO). VICTORIA: Millgrove, Sept. 1929, F. E. Wilson, 2 ♂♂, 1 ♀.

Subfamily **ORTHOCLADIINAE**

In the present author's work on the African and New Zealand species, a classification was adopted which was based on that of Goetghebuer which is itself a modification of that set out by Edwards (1929). However, a new classification has now been proposed by Brundin (1956) which takes into account not only adult characters but also considers those of the early stages.

The use and definition of genera in this section follows Brundin's classification as closely as possible, but the key does not closely resemble his. In his work, which was based on northern European genera, he recognized 52 genera, whilst in the Australian fauna only 25 genera have been found and some of the more difficult European genera are not present. For this reason it has been possible to offer a simpler but not necessarily a phylogenetic key. For details of the phylogeny within the subfamily, reference should be made to Brundin's paper.

It will be noticed that Brundin has been followed in including the subfamilies Diamesinae, Corynoneurinae, and Clunioninae in the Orthocladiinae. The present author is not wholly in agreement with this course of action as it is a good deal more convenient to consider them as separate subfamilies and the necessary characters seem to exist in the adult stage. However, according to Brundin, the structure of the early stages does not justify such a strong separation and there for the moment the matter must rest.

KEY TO AUSTRALIAN GENERA OF THE ORTHOCLADIINAE

1. Postnotum lacking median longitudinal furrow; male antenna without plumes; marine or intertidal species (in Australia) 2

Postnotum with well-developed longitudinal furrow; male antenna only lacking plumes in *Doloplastus*; species normally associated with fresh water, only occasional ones being found between tide marks 3

2. Fifth tarsal segment simple, 2nd segment of hind tarsi shorter than 3rd; wings absent in female .... *Clunio* Haliday

Fifth tarsal segment deeply trilobed, 2nd segment of hind tarsi longer than 3rd; both sexes fully winged .... *Telmatogeton* Schiner

3. Posterior fork basal to crossvein, true base of M_{3+4} present .... *Heptagyia* Philippi

Base of M_{3+4} absent 4

4. Minute species, wing length 1–2 mm; R_1 and R_{4+5} entirely fused to each other and almost entirely fused to costa to form a thickened "clavus", extending at most to two-thirds, usually much less, of wing length, especially short in males 5

Clavus absent, veins not fused 6

5. Eyes pubescent, posterior tibia simple .... *Thienemanniella* Kieffer

Eyes bare, posterior tibia obliquely truncate and with a conspicuous apical projection on inner side .... *Corynoneura* Winnertz

6. Wings with macrotrichia on membrane at least at apex 7

Wing membrane quite bare of macrotrichia 11

7. Mouthparts greatly elongated to form a sucking tube, sometimes as long as whole body .... *Rhinocladius* Edwards

Mouthparts not produced into a long tube 8

8. Acrostichal bristles present 9

Acrostichal bristles absent 10

9. Eyes with well-formed dorsal narrow portions, posterior fork long (Fig. 12, *c*) .... *Parametriocnemus* Goetghebuer

Eyes without dorsal narrow portions, posterior fork shorter (Fig. 12, *a*) .... *Metriocnemus* Wulp

10. Squama with strong complete fringe .... *Allometriocnemus*, gen. nov.

Squama bare or with 2–3 bristles .... *Gymnometriocnemus* Goetghebuer

11. Eyes densely pubescent; squama only bare in species with heavily patterned wings 12

Eyes bare, only pubescent in some species of *Smittia* and *Pseudosmittia*, and here squama bare and wings unpatterned 14

12. Wings heavily patterned .... *Diplocladius*, subgen. *Stictocladius* Edwards

Wings plain 13

13. Mesonotum with distinct, erect, dorsocentral bristles arising from distinct pits .... *Syncricotopus* Brundin

Dorsocentral bristles small and decumbent, their punctures scarcely visible .... *Cricotopus* Wulp

14 Wings with heavy black pattern or else with clypeus produced as short proboscis .... *Nasuticladius*, gen. nov.

Wings without heavy pattern, clypeus not produced 15

15. Squama either partially or completely fringed, pronotum often quite large 16

Squama quite bare, pronotum usually more reduced 21

16. Outer spur of hind tibia at least half length of inner 17
    Outer spur less than half length of inner 18
17. Fourth tarsal segment cordiform; styles simple ....*Cardiocladius* Kieffer
    Fourth tarsal segment cylindrical; styles double ....*Austrobrillia,* gen. nov.
18. Distinct microtrichia present on wing membrane (monocular microscope may be necessary) 19
    Microtrichia not distinct 20
19. Squamal fringe complete ....*Austrocladius,* gen. nov.
    Squamal fringe reduced to 2–5 hairs ....*Limnophyes* Eaton
20. R_{2+3} in contact with R_{4+5} and without separate clear ending in costa ....*Eukiefferiella* Thienemann
    R_{2+3} ending in costa about midway between R_1 and R_{4+5} ......*Kiefferophyes,* gen. nov.
21. Antenna with stout black bristle at apex ....*Smittia* Holmgren
    Antenna without this bristle 22
22. Distinct pulvilli present ....*Camptocladius* Wulp
    Pulvilli absent 23
23. Costa retracted, ending well before level of apex of M_{3+4}, posterior fork short, accessory fork present (Fig. 16, *d*) ....*Orthosmittia* Goetghebuer
    Costa ending on level with or beyond apex of M_{3+4}, posterior fork longer, no accessory fork 24
24. Male hypopygium bulky, anal point present; male antenna with only 8 segments and no plumes ....*Doloplastus* Skuse
    Male hypopygium bulky, anal point absent; male antenna with full number of segments, plumes present ....*Pseudosmittia* Goetghebuer

Genus HEPTAGYIA Philippi

Heptagyia Philippi, 1865, p. 635. Edwards, 1931, p. 265.

Type species *Heptagyia annulipes* Philippi, 1865.

Eyes bare, no dorsal narrow portions, antennae of male with 13–14 segments in Australian species, but with as few as 6 in other Regions. Prothorax divided medially, hairy at sides only; acrostichal and usually dorsocentral bristles, short, decumbent, and with indistinct pits; postnotum short and more rounded than usual. Base of M_{3+4} (*m-cu* of previous authors) present, beyond posterior fork; wings clothed with microtrichia. Anal point present or absent, styles often forked; tibiae sometimes ringed.

The important features defining this genus seem to be the presence of the base of M_{3+4}, the reduced thoracic bristles, and the rounded postnotum. One of the Australian species has banded tibiae and the other possesses an anal point.

KEY TO AUSTRALIAN SPECIES OF THE GENUS HEPTAGYIA

Tibiae with a broad white band; male tarsi bearded; anal point absent ....*tasmaniae,* sp. nov.
Tibiae unicoloured; male tarsi not bearded; anal point present ......*tonnoiri,* sp. nov.

HEPTAGYIA TASMANIAE, sp. nov.

Blackish, thorax partially pruinose, dorsocentral bristles white, more conspicuous than usual; anterior tarsi of male bearded, tibiae with broad white ring; anal point absent, styles with small basal lobe on outer side.

Wing length.—3·75 mm (one specimen).

Male.—*Head*, mouthparts, and antennae dark brown or blackish, A.R. apparently about 1·0, eyes bare. *Thorax* blackish, with some pruinosity especially on pleura, scutellum yellowish and with several rows of pale hairs; acrostichal bristles whitish, very small and decumbent, dorsocentrals longer, more erect, but whitish and thin, pits more distinct. *Legs* brown, all tibiae with a broad white band in basal half; anterior tibial spur well developed, middle and posterior tibiae each with 2 long subequal spurs and no comb; anterior tarsi bearded, L.R. 0·75, 4th tarsal segment subequal to 5th and bilobed below at apex. *Wings* with distinct microtrichia, squama fringed, *r-m* long and curved, base of M_{3+4} slightly distal to posterior fork; halteres yellow. *Abdomen* dark brown, hypopygium (Fig. 4, *a*) lacking anal point; style rather boot-shaped, not strongly forked, but with small basal lobe.

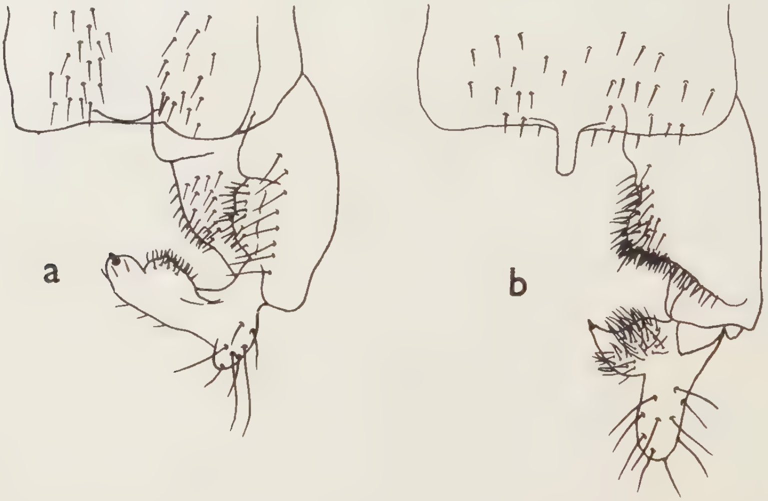

Fig. 4.—Male hypopygia of *Heptagyia*: *a*, *H. tasmaniae; b*, *H. tonnoiri*.

Type.—Holotype ♂, Cradle Valley, Tas., Jan. 1923, A. L. Tonnoir (SPHTM).

HEPTAGYIA TONNOIRI, sp. nov.

Blackish, dorsocentral and acrostichal bristles all decumbent, legs without white bands on tibiae, beard absent, anal point present, style forked.

Wing length.—3·2–3·5 mm.

Male.—*Head*, mouthparts, and antennae black with some grey dusting, eyes bare, A.R. about 1·3. *Thorax* black with pruinosity on shoulders, along hair lines, and on pleura; scutellum black, acrostichal and dorsocentral bristles small, whitish, and decumbent, scutellum uniformly pubescent. *Legs* dark brown, lacking white markings on tibiae, tarsal beard absent, structurally similar to *tasmaniae*. *Wings* similar to *tasmaniae*. *Abdomen* dark, all segments paler apically, hypopygium (Fig. 4, *b*) with short blunt anal point, style with strong basal lobe which is equal in size to main lobe, so that style appears forked.

Female.—Similar to male, antennae 8- or 9-segmented, the penultimate segment sometimes being divided.

Types.—Holotype ♂ and 1 ♀ paratype, Canberra, Sept. 1931. Further paratypes: AUSTRALIAN CAPITAL TERRITORY: Canberra, Nov. 1929, 1 ♂, Sept. 1930, 2 ♂♂, July 1931, 1 ♂, 1 ♀, all coll. A. L. Tonnoir; Molonglo R., Sept. 1931, A. L. Tonnoir, 7 ♂♂. NEW SOUTH WALES: Piper's Creek, Mt. Kosciusko, Feb. 1924, A. J. Nicholson, 3 ♀♀. Six paratypes retained in BM, holotype and remainder of series returned to CSIRO.

Genus CLUNIO Haliday

Clunio Haliday, 1855, p. 62. Edwards, 1929, p. 370. Stone and Wirth, 1947, pp. 201–24. Brundin, 1956, p. 63.

Type species *Clunio marinus* Haliday, 1855.

Eyes usually pubescent, mouthparts reduced, palpi with only 1 segment; antennae of male with 11 segments in most species, lacking plumes, segment 3 elongate, 4th to penultimate subspherical, 11th elongate and slightly clavate; antennae reduced in female. Wings well developed in male, broadly rounded and petiolate, anal angle prominent, squama bare, costa not produced, *Cu* curved, wings and halteres quite absent in female. Legs stout in male, tibial spurs single or absent, tarsi short, basal segment 2 or 3 times as long as second, 2–5 times broader than long, except for segment 3 of hind tarsus which is twice as long as broad and swollen dorsally; legs of female short, spurs absent. Male genitalia large, rotated through 100–180°, 9th tergite forming a large pubescent median ventral plate, conically produced distally into a median nipple.

A single species, widely distributed in the Pacific Ocean, has been found in New South Wales. The larvae are marine, the adults are found in the intertidal zone.

CLUNIO PACIFICUS Edwards

Clunio pacificus Edwards, 1926, p. 790; 1928, p. 60. Oka, 1930, pp. 253–80. Tokunaga, 1933, p. 89; 1938, p. 126. Stone and Wirth, 1947, p. 219.

The New South Wales specimens mentioned below conform well with type material in the British Museum. The species has been discussed fully in the literature, the paper by Oka being particularly full and describing both sexes in detail. As with other species of the genus, the male is fully winged and the female apterous and lacking halteres. Three of the males were captured with the females attached *in copula*. It can be distinguished from others in the genus by the proportions of the male antenna, segment 11 being fully as long as 4–10 taken together, and by the spur of the male hind tibia which is conspicuously hooked.

Specimens examined.—NEW SOUTH WALES: Mona Vale, intertidal rocks, Sept. 1956, W. W. Wirth, 80 ♂♂, 3 ♀♀; Warriewood, Sept. 1956, W. W. Wirth, 1 ♂. It has also been recorded from Samoa, Japan, Ryukyu Is., Marianas Is. An additional record is NEW HEBRIDES: Aneityum, Nov. 1930, L. E. Cheesman, 420 ♂♂ (BM).

Genus TELMATOGETON Schiner

Telmatogeton Schiner, 1866, p. 931. Wirth, 1947, pp. 143–191; 1949, p. 170.

Type species *Telmatogeton sancti-pauli* Schiner, 1868.

Head small and set under arched mesonotum; eyes round and widely separated, bare; antennae 7-segmented and non-plumose in both sexes; palpi more or less 2-segmented. Wings well developed in both sexes, radial veins strong and setigerous. Legs long and slender, front femora often clavate at base, tibial spurs single or double; 5th tarsal segment prominently trilobed, claws of female simple, of male bifid into a sharp inner arm and a pectinate outer arm, empodium long and plumose. Abdomen long and slender, hypopygium usually rotated to a maximum of 90°, simple.

A very full account of the genus with further references and synonymy is given by Wirth (1947).

A single species is known from the marine intertidal zone of beaches of New South Wales and South Australia.

TELMATOGETON JAPONICUS Tokunaga

Telmatogeton japonicus Tokunaga, 1933, p. 95; 1935, pp. 491–511. Wirth, 1947, p. 171; 1952*b*, p. 308.

Telmatogeton australicus Womersley, 1936, pp. 437–43 (syn. nov.).

This species has been described in great detail by Tokunaga and Wirth and it is unnecessary to repeat the description here. It is a medium-sized blackish brown species with unequally bifid claws; the mid-trochanters lack a pubescent knob; the mesonotum has distinct rows of about 5 dorsocentral hairs; there are about 20 setae on the scutellum; the last antennal segment is contracted apically.

T. australicus was described from the beaches of South Australia and through the kindness of Dr. G. F. Gross I have been able to see two paratypes from the South Australian Museum and find them to be identical with specimens from Sydney. Womersley separated his species by the absence of mesonotal rows of hairs and by the more oval terminal antennal segment. There are, however, perfectly normal rows of bristles on the paratypes and the species seems to be a synonym of *japonicus*.

Specimens seen.—NEW SOUTH WALES: Mona Vale, intertidal rocks, Sept. 1956 and Warriewood Beach, Sydney, Aug. 1956, W. W. Wirth, numerous males. SOUTH AUSTRALIA: Sellick Beach, 2 ♂ paratypes. WESTERN AUSTRALIA: Rottnest I., 26.viii.1960, D. Edward, 3 ♂♂. The species was originally described from the coasts of Japan, but it has since been recorded from Hawaii (Wirth 1947), Florida, and Long Island, N.Y. (Wirth 1952*a*).

Genus CARDIOCLADIUS Kieffer

Cardiocladius Kieffer, 1912*a*, p. 22. Edwards, 1929, p. 317. Freeman, 1956, p. 321. Brundin, 1956, p. 66.

Type species *Cardiocladius ceylanicus* Kieffer, 1912.

Eyes bare; pronotum wide and collar-like, with a median V-shaped emargination; dorsocentral bristles erect and well developed, acrostichals present but small.

Fourth tarsal segment distinctly cordiform, much shorter than 5th; pulvilli absent; spurs of hind tibia well developed, the outer more than half length of the inner. Wing without macrotrichia, anal lobe well developed, squama fringed. Anal point absent.

The cordiform 4th tarsal segment renders this genus easily identifiable. The larvae are to be found in streams amongst *Simulium* larvae and pupae upon which they feed. A single species is known to me from Australia.

CARDIOCLADIUS AUSTRALIENSIS, sp. nov.

Dark brown, shoulders pruinose, legs without markings, coxite lobe right-angled, styles with small apical spine.

Wing length.—2·5 mm.

Male.—*Head*, mouthparts, and antennae dark brown, A.R. about 1·5. *Thorax* dark brown, dorsum almost blackish, scutellum paler and with 2–3 rows of short bristles; viewed from in front, shoulders and prescutellar area strongly pruinose; dorsocentral bristles uniserial anteriorly, irregularly biserial posteriorly. *Legs* brown and without distinct markings, L.R. about 0·8, tarsal beard absent. *Wings* normal for the genus, halteres yellow. *Abdomen* brown, hypopygium (Fig. 5, *a*) without anal point, coxite lobe right-angled, style with small apical spine.

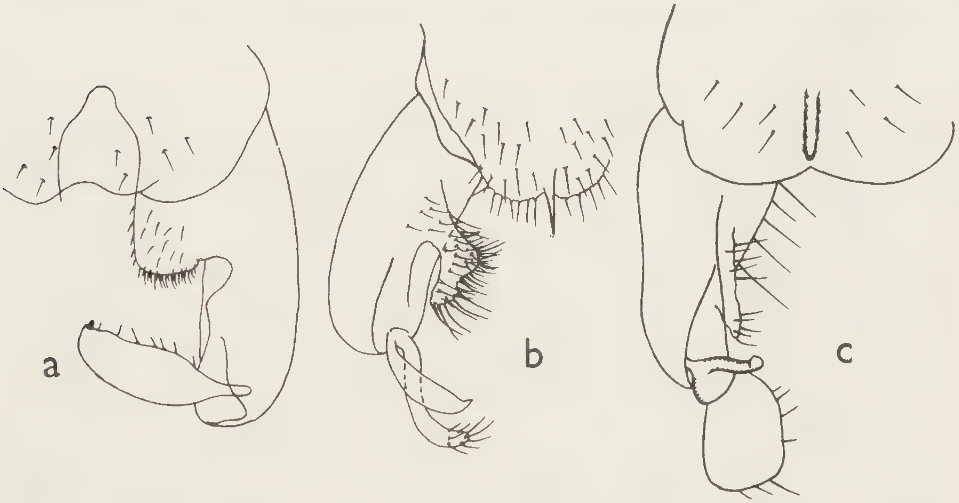

Fig. 5.—Male hypopygia of: *a*, *Cardiocladius australiensis; b*, *Austrobrillia longipes; c*, *Diplocladius* (*Stictocladius*) *multiserialis.*

Female.—Similar to male but rather darker, abdomen with small lateral lobes at apex.

Types.—Holotype ♂ and paratype ♂, Launceston, Tas., Oct. 1922, A. L. Tonnoir. Further paratypes: NEW SOUTH WALES: Mt. Kosciusko, Feb. 1924, A. J. Nicholson, 1 ♀. AUSTRALIAN CAPITAL TERRITORY: Cotter R., Apr. 1931, A. L. Tonnoir, 3 ♂♂, 7 ♀♀ ("larvae predacious on *Simulium* larvae"). Two ♂♂ and two ♀♀ retained in BM, holotype returned to SPHTM, remainder of series returned to CSIRO.

Genus AUSTROBRILLIA, gen. nov.

Type and only known species *Austrobrillia nudipennis*, sp. nov.

Eyes bare and with well-formed dorsal narrow portions. Pronotum visible from above but with a wide V-shaped central separation between the lobes, with a few hairs laterally and none centrally; acrostichal bristles absent, dorsocentrals well formed and erect, mesonotum of normal development. Tibial spurs as in *Brillia*, i.e. outer one on posterior leg more than half length of inner; pulvilli absent. Wings quite bare of macrotrichia, but microtrichia visible as strong punctures as in *Brillia*, squama with strong fringe; venation very similar to *Brillia*, costa slightly produced, posterior fork long, *r-m* long, R_{2+3} ending midway between R_1 and R_{4+5}. Male hypopygium (Fig. 5, *b*) with bare anal point and hairy 9th tergite; coxite appendage free and hairy, styles forked right from the base, one branch more sclerotized and pointed, the other softer and with hairs at the apex.

Superficially this genus is very similar to *Brillia*, but the bare wings, bare pronotal lobes, presence of anal point, and the hairiness of the coxite lobe make a separate genus preferable.

AUSTROBRILLIA LONGIPES, sp. nov.

Yellowish brown species, abdomen yellow with brown bands, male styles deeply cleft, L.R. at least 1.

Wing length.—3·2–3·8 mm.

Male.—*Head*, mouthparts, and antennae yellowish brown, A.R. 1·75. *Thorax* with yellowish brown or yellowish background and brown stripes; scutellum pale, dorsocentral bristles mainly uniserial. *Legs* brownish or yellowish, L.R. 1 or rather more. *Abdomen* yellow, each segment with a broad brown basal band; hypopygium (Fig. 5, *b*) as described above in the generic description.

Female.—Not known.

Types.—Holotype ♂, Harz Mountains, Tas., Dec. 1922, A. L. Tonnoir (SPHTM), Paratypes: TASMANIA: Burnie, Oct. 1922, 1 ♂, Eaglehawk Neck, Nov. 1922, 1 ♂, Cradle Valley, Jan. 1923, 1 ♂, all coll. A. L. Tonnoir. VICTORIA: Walhalla, Apr. 1930, 2 ♂♂, Healesville, Apr. 1929, 1 ♂, all coll. F. E. Wilson. Two paratypes retained in BM.

Genus DIPLOCLADIUS Kieffer

Subgenus STICTOCLADIUS Edwards

Stictocladius Edwards, 1931, p. 279 (as subgenus of *Spaniotoma*).

Diplocladius (Kieffer) Brundin, 1956, p. 70. Freeman, 1959, p. 415.

Type species *Diplocladius cultriger* Kieffer.

Diplocladius, originally described for a Palaearctic species, may be distinguished from other orthocladiine genera because the eyes are densely pubescent, the outer spur of the hind tibia is more than half as long as the inner, wings without macrotrichia but microtrichia distinguishable, squama usually bare;

the male styles are double, there being a more fleshy lobe and a narrow more sclerotized branch.

Stictocladius, described for south temperate species from Patagonia and South Chile, is structurally almost indistinguishable from *Diplocladius*, but the wings are strongly patterned and the tibiae may be white-ringed as in *Cricotopus*, a genus from which it may be distinguished by the erect dorsocentral hairs. Because the two genera are so similar structurally Brundin placed *Stictocladius* as a synonym of *Diplocladius*, a view upheld by the present author in his work on the New Zealand species.

There are now eight species of *Stictocladius* known, three from southern South America, two from New Zealand, and three from the southern part of Australia. All are closely similar in structure, all show the same heavily patterned wings, and none possess the definite anal point of *Diplocladius*. Until more is known of the early stages of both genera, I now think it preferable not to synonymize *Stictocladius* but to treat it as a subgenus, with type species *S. pulchripennis* Edwards, 1931, in order to indicate that there is at least some difference between the southern and northern temperate species.

KEY TO AUSTRALIAN SPECIES OF THE GENUS DIPLOCLADIUS, SUBGENUS STICTOCLADIUS

1. Dorsocentral bristles uniserial posteriorly as well as anteriorly; legs usually with some indication of pale band on tibiae .... *uniserialis*, sp. nov.
   Dorsocentral bristles tri- or quadriserial posteriorly, legs usually all dark 2
2. Wing markings formed of 2 broad bands, neither containing pale areas (Fig. 6, *c*) .... *victoriensis*, sp. nov.
   Outer wing marking split into two by large pale spots in the cells (Fig. 6, *b*) .... *multiserialis*, sp. nov.

DIPLOCLADIUS (STICTOCLADIUS) MULTISERIALIS, sp. nov.

Blackish species, tibiae without pale markings, dorsocentral bristles forming broad bands in prescutellar area, wings with dark markings forming 3 bands, squama bare.

Wing length.—1·8–2·25 mm.

Male.—*Head*, mouthparts, and antennae blackish, eyes densely pubescent, A.R. 0·75. *Thorax* blackish, slightly shining and pruinose anteriorly, scutellum matt black; dorsocentral bristles uniserial anteriorly but irregularly tri- or even quadriserial in prescutellar area; humeral pits distinct. *Legs* dark brown, L.R. 0·75, pulvilli absent, no tarsal beard, tibiae without paler markings. *Wings* (Fig. 6, *b*) with dark markings arranged as 3 transverse bands, the apical 2 really formed by the breaking of 1 broad band by 3 translucent areas; squama bare. *Abdomen* black, hypopygium (Fig. 5, *c*) with anal point indicated by a slight ridge on 9th tergite, coxites fairly narrow and with slight inner lobe, style in 2 parts as usual, the softer part suboval and more or less flattened, the harder part narrow.

Female.—Antennae with 6 segments, shoulders yellowish, wings rather darker, otherwise similar to male.

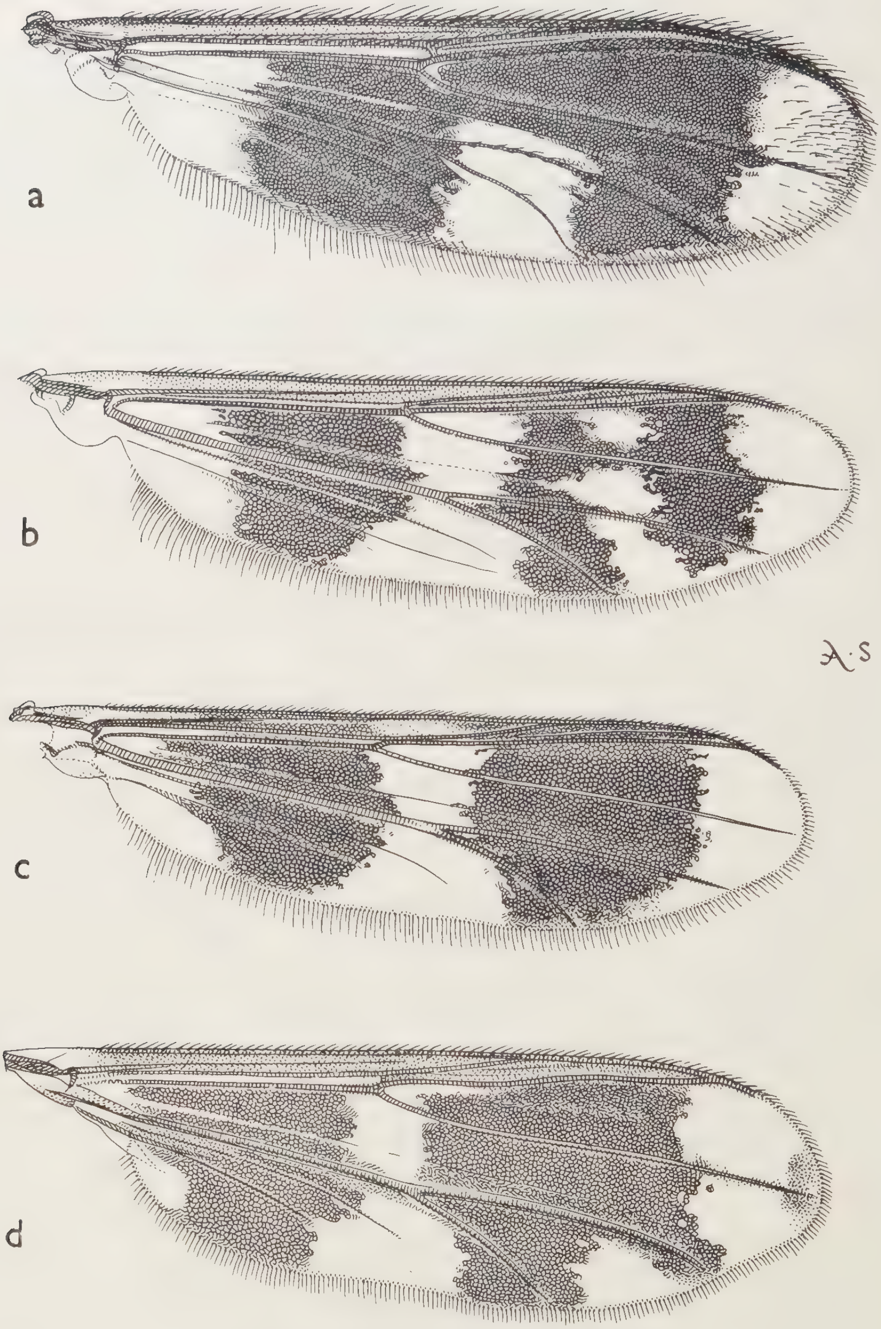

Fig. 6.—Wings of Orthocladiinae: *a*, *Allometriocnemus pictus; b*, *Diplocladius* (*Stictocladius*) *multiserialis; c*, *D.* (*S.*) *victoriensis; d*, *D.* (*S.*) *uniserialis*. Drawn by Mr. A. Smith.

Types.—Holotype ♂ and 1 ♀ paratype, Manly, N.S.W., June 1946, D. H. Colless (SPHTM). Further paratypes: TASMANIA: Burnie, Oct. 1922, 2 ♂♂, A. L. Tonnoir. One paratype retained in BM, remainder of series returned to SPHTM.

DIPLOCLADIUS (STICTOCLADIUS) VICTORIENSIS, sp. nov.

Structurally this species is indistinguishable from *multiserialis* and like it, has multiserial dorsocentral bristles. However, the wing markings are in the form of 2 broad bands (Fig. 6, *c*) neither having clear areas; in addition the tibiae may be pale, though not white. It is possible that it is merely a form of *multiserialis.*

Types.—Holotype ♂, Belgrave, Vic., Mar. 1929, F. E. Wilson (returned to NM). Paratype: VICTORIA: Sassafras, Oct. 1922, A. L. Tonnoir, 1 ♂ (SPHTM). AUSTRALIAN CAPITAL TERRITORY: Blundell's, Apr. 1931, L. F. Graham, 1 ♂ (CSIRO). NEW SOUTH WALES: Fitzroy Falls, Nov. 1937, 1 ♂, Oct. 1938, 2 ♂♂, 3 ♀♀, A. L. Tonnoir (CSIRO and BM).

DIPLOCLADIUS (STICTOCLADIUS) UNISERIALIS, sp. nov.

A blackish species differing from the other two by having partially whitish or pale tibiae, wings with a pale spot in the fork cell and dorsocentral bristles arranged uniserially.

Wing length.—2·0 mm.

Male.—*Head* blackish, mouthparts and antennae dark brown, eyes densely pubescent, A.R. 0·75. *Thorax* black, only slightly pruinose, humeral pits large, dorsocentral bristles uniserial and well spaced. *Legs* dark brown, tibiae in most specimens more or less whitish or pale in basal half; L.R. 0·8. *Wings* (Fig. 6, *d*) with 2 broad blackish bands, the more apical one with a clear spot in the posterior fork, apex of wing more or less darkened as well; squama bare, halteres dark. *Abdomen* blackish, hypopygium similar to *multiserialis.*

Female.—Similar to male.

Types.—Holotype ♂, Mt. Wellington, Tas., Nov. 1922, A. L. Tonnoir (SPHTM). Paratypes: TASMANIA: Burnie, Oct.–Nov. 1922, A. L. Tonnoir, 2 ♂♂, 2 ♀♀. VICTORIA: Belgrave, Mar. 1929, F. E. Wilson, 1 ♂. AUSTRALIAN CAPITAL TERRITORY: Lee Spring, Nov. 1938, A. L. Tonnoir, 1 ♂. NEW SOUTH WALES: Narrabeen, Sept.–Dec. 1956, W. W. Wirth, 3 ♂♂.

Genus EUKIEFFERIELLA Thienemann

Eukiefferiella Thienemann, 1926, p. 325. Edwards, 1929, p. 350 (in part). Goetghebuer, 1944, p. 114 (in part). Brundin, 1956, p. 82.

Nanocladius Freeman, 1956, p. 338 (in part).

Type species *Dactylocladius longicalcar* Potthast, 1915 (not Kieffer, 1911).

Eyes usually bare; last antennal segment often thickened, lacking straight bristle at apex. Pronotum of normal development; acrostichal bristles absent, dorsocentrals erect and usually in a simple row; wings without either macrotrichia or distinct microtrichia, anal lobe usually reduced, squamal fringe variably developed, sometimes quite absent; R_{2+3} appearing to be absent, owing to its lying in close contact with R_{4+5}, gradually fading out towards the tip and not distinctly reaching the costa.

The original description of this genus was based on the early stages, which seem to have been misidentified so that the material called *longicalcar* by Potthast was not conspecific with *longicalcar* Kieffer. The whole matter is extremely complex and it seems that the species now called *Eukiefferiella longicalcar* is really a homonym and requires renaming. However, this is not the place in which to do that and it is preferred to leave the matter to be finally disentangled by someone working on the Palaearctic fauna. Following Brundin, *Nanocladius* is now regarded as a separate genus.

A single species is known to me from Australia.

EUKIEFFERIELLA INSOLIDA (Skuse), comb. nov.

Orthocladius insolida Skuse, 1889, p. 258. Kieffer, 1906, p. 27; 1917, p. 228.

The holotype male, which is the only known specimen of this species, is heavily damaged and securely gummed to a piece of card with the only remaining wing beneath the thorax. However, the hypopygium is available and I have stained and mounted it. From this and from Skuse's description of the wing (R_{2+3} absent) it is clear that the species belongs to *Eukiefferiella* and is closely related to the Palaearctic species *E. hospita* Edwards and *brevicalcar* Kieffer and to the African species *claviger* Freeman.

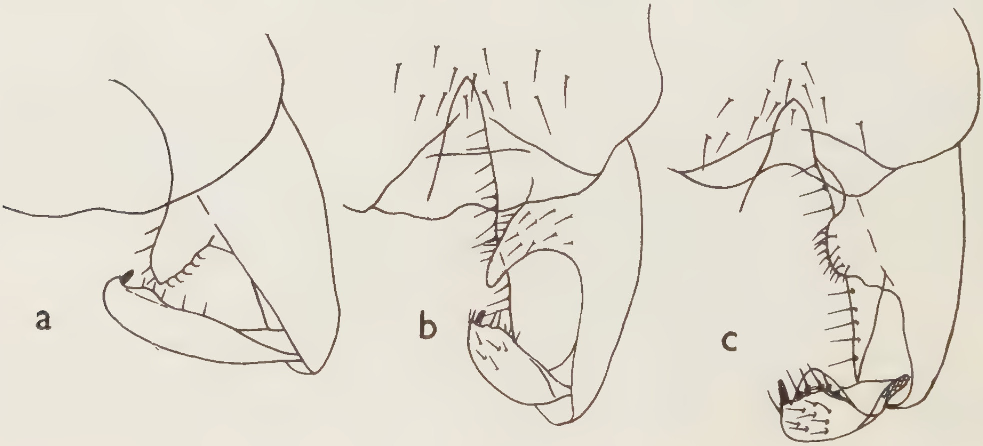

Fig. 7.—Male hypopygia of: *a*, *Eukiefferiella insolida;* *b*, *Cricotopus albitibia;* *c*, *C. annuliventris.*

Wing length.—1·4 mm.

Male.—*Head,* antennae, and mouthparts dark brown, eyes bare, A.R. about 0·5, antennae with 13-segmented flagellum, slightly clubbed. *Thorax* mostly dark brown, i.e. stripes fused, but shoulders yellow. *Legs* brownish, L.R. 0·75, pulvilli absent. *Wings,* judging from Skuse's figure, extremely similar to *claviger*; costa and apex of R_{4+5} retracted, the former produced and the latter ending midway between M_{3+4} and Cu_1, posterior fork distal to crossvein, both branches straight. *Abdomen* dark brown, hypopygium (Fig. 7, *a*) lacking anal point, 9th tergite bare, coxite lobe prominent, style more or less parallel-sided, rounded at apex.

Type.—Holotype ♂, Middle Harbour, Sydney (MM).

Genus SYNCRICOTOPUS Brundin

Syncricotopus Brundin, 1956, p. 106.

Trichocladius Edwards, 1929, p. 328 (in part) (? not *Trichocladius* Kieffer, 1906). Freeman, 1956, p. 313; 1959, p. 414.

Type species *Chironomus rufiventris* Meigen, 1830, *sensu* Edwards, 1929.

Eyes densely pubescent, no dorsal narrow portions. Pronotum normal, mesonotum with distinct acrostichal bristles, dorsocentrals normal, arising from distinct and often obvious punctures, humeral pits larger than usual. Wings without macrotrichia, squama fringed, costa produced. Spurs and combs of *Orthocladius* type. Hypopygium without anal point.

As pointed out by Brundin, the use of *Trichocladius* for this genus by Edwards is not warranted as the type species of *Trichocladius* is quite unknown and unrecognizable; also, he points out, Thienemann used it for a quite different group, namely a part of *Cricotopus*. Brundin's views are adopted here.

There is one Australian species known to me which also occurs in New Zealand.

SYNCRICOTOPUS PLURISERIALIS (Freeman), comb. nov.

Trichocladius pluriserialis Freeman, 1959, p. 414.

Male black except for shoulders, female with stripes more or less separated, prothorax silvery, pulvilli and anal point absent. Very similar to the African species *micans* Kieffer, separated by the multiserial dorsocentral bristles.

Wing length.—2–2·5 mm.

Male.—*Head* and mouthparts brown, antennae blacker, eyes densely pubescent, A.R. 1·5. *Thorax* blackish, slightly paler at wing bases and on shoulders, pronotum silvery; humeral pits conspicuous, dorsocentral bristles bi- or triserial, their pits forming broad and conspicuous bands. *Legs* dark brown, trochanters yellow, pulvilli absent, L.R. 0·5. *Wings* normal for the genus, halteres yellow. *Abdomen* uniformly dark brown, hair pits conspicuous; hypopygium without anal point, coxite lobe moderately developed, similar to the African species *micans*.

Female.—Similar to male in general features, thoracic stripes partially or completely separate.

Type.—Holotype ♂, R. Purau, Christchurch, N.Z. (BM).

Specimens seen from Australia.—NEW SOUTH WALES: S. Creek, Dee Why, Oct. 1956, W. W. Wirth, 4 ♂♂. AUSTRALIAN CAPITAL TERRITORY: Black Mountain, Sept. 1930, A. L. Tonnoir, 2 ♂♂, 1 ♀.

Genus CRICOTOPUS van der Wulp

Cricotopus van der Wulp, 1874, p. 132. Edwards, 1929, p. 317. Freeman, 1956, p. 303; 1959, p. 413. Brundin, 1956, p. 109.

Type species *Chironomus tibialis* Meigen, 1818.

Eyes densely pubescent; humeral pits small, dorsocentral hairs minute and decumbent, the punctures from which they arise scarcely visible under a binocular microscope; abdomen often with yellow markings, male hypopygium and female cerci often white, anal point absent; tibiae often with a broad white ring; wings without macrotrichia or visible microtrichia, squama fringed.

Key to Australian Species of the Genus Cricotopus

Anterior and middle tibiae with white ring in basal half; abdomen with yellow markings on both segments 4 and 5 as well as on segment 1 .... *annuliventris* (Skuse)

All tibiae largely white, only dark at base and apex; abdomen with yellow or leaden markings on segments 1 and 4, segment 5 completely black ...... *albitibia* (Walker)

Cricotopus annuliventris (Skuse), comb. nov.

Orthocladius annuliventris Skuse, 1889, p. 255. Kieffer, 1906, p. 27; 1917, p. 228.

Black species, thorax rather shining, legs with white rings on fore and mid tibiae, abdomen yellowish or leaden coloured on at least segment 1 and basal halves of segments 2, 4, and 5, incisures of other segments may also be paler. Very similar to the New Zealand species *C. zealandicus* Freeman for which it may be an earlier name; it differs in the more definite coxite lobe and the larger style flange.

Wing length.—1·75–2·5 mm.

Male.—*Head,* mouthparts, and antennae black, A.R. about 1·0. *Thorax* shining black. *Legs* blackish, trochanters yellow; anterior and middle tibiae with a white ring placed in the basal half but with basal fifth of each tibia black; posterior tibia without definite pale markings; L.R. 0·6. *Wings* with fairly dark veins which may be dark-seamed as well, costa produced, anal lobe distinct, squamal fringe complete; halteres black or brown, occasionally paler. *Abdomen* blackish with yellowish or leaden markings; segment 1 completely yellow, segments 2, 4, and 5 yellow on basal half or more, hypopygium yellow; in addition, any or all incisures are paler in some specimens. Hypopygium (Fig. 7, *c*) with characteristic blunt coxite lobe and strongly produced flange on style.

Female.—Similar to male, although thorax sometimes browner on shoulders.

Types.—I have seen the cotype series of 4 ♂♂ which is in the Macleay Museum and I have selected one from Lawson, Blue Moutains, N.S.W., as lectotype.

Additional specimens seen.—NEW SOUTH WALES: Sydney and environs, numerous specimens, W. W. Wirth and D. J. Lee; Macquarie Pass, Oct. 1938, A. L. Tonnoir, 1 ♂, 1 ♀. AUSTRALIAN CAPITAL TERRITORY: Canberra and environs, 9 ♂♂, 21 ♀♀; Blundell's 6 ♂♂, 10 ♀♀, all coll. A. L. Tonnoir. VICTORIA: Melbourne and environs, F. E. Wilson, 7 ♂♂. TASMANIA: Cradle Valley, L. Margaret, Burnie, Fern Tree, Mt. Wellington, Oct.–Nov. 1929, A. L. Tonnoir, 4 ♂♂, 7 ♀♀. SOUTH AUSTRALIA: Aldgate, Oct. 1929, F. E. Wilson, 3 ♂♂.

CRICOTOPUS ALBITIBIA (Walker)

Chironomus albitibia Walker, 1848, p. 16.
Cricotopus albitibia Freeman, 1956, p. 306.

The Australian specimens mentioned below are inseparable from African material and must be treated as belonging to the same species. They are extremely similar to the Palaearctic species *C. bicinctus* Meigen and it is possible that all should be considered as members of the one species. It may be separated from *annuliventris* by the abdominal pattern and male genital structure.

Wing length.—1·5–2·8 mm.

Male.—Head, mouthparts, and antennae black, A.R. 1. *Thorax* shining black, shoulders hardly paler. *Legs* black with yellow trochanters; tibiae white, tips and bases narrowly black, apical black area about twice width of basal one; L.R. 0·7. *Wings* with normal venation, costa slightly produced; halteres yellow. *Abdomen* black, segment 1, base of 2, and whole of 4 yellow or leaden yellow; hypopygium yellow, coxites with pointed inner lobe (Fig. 7, *b*).

Female.—Similar to male, but thorax often rather paler so that the stripes can just be distinguished; cerci white.

Type.—Holotype ♂ from Sierra Leone is in the British Museum.

Specimens seen from Australia.—NEW SOUTH WALES: near Lake George, Nov. 1953, S. J. Paramonov, 1 ♀ (CSIRO). AUSTRALIAN CAPITAL TERRITORY: Black Mountain, Apr. 1930, A. L. Tonnoir, 1 ♂. WESTERN AUSTRALIA: Lake Monger, Mar. 1955, E. P. Hodgkin, 6 ♂♂, 6 ♀♀ (BM).

Genus AUSTROCLADIUS, gen. nov.

Spaniotoma (*Orthocladius*) Edwards, 1931, p. 283 (in part).
Chaetocladius Freeman, 1959, p. 417 (not *Chaetocladius* Kieffer, 1911).

Type species *Camptocladius terjugus* Skuse, 1889.

Eyes bare, dorsal narrow portion not developed, apex of male antenna with a few short hairs, vertex bristles only present laterally, female antenna with simple sensory bristles, palpi long. Prothorax fairly well developed, similar to *Chaetocladius*, dorsocentral bristles distinct, uni- or biserial, acrostichals completely absent, scutellar bristles often in 2 rows, some species also have a patch of setae on the upper part of the sternopleuron. Ratio of anterior basitarsus to tibia more than 0·5, pulvilli absent, outer spur of hind tibia without strong teeth near the centre. Wings without macrotrichia but with fine microtrichia, squama fringed, R_{2+3} meeting costa about half-way between R_1 and R_{4+5}, costa produced, *r-m* rather long and horizontal, Cu_1 not strongly curved, posterior fork distal to crossvein. Anal point of male either absent or very small, 9th tergite with some bristles.

This genus is erected for the reception of species which would have been previously placed by the present author in *Chaetocladius*, but with Brundin's reclassification they cannot be placed there on account of the simple posterior tibial spur, absence of acrostichal bristles, restriction of vertex bristles, and virtual absence of anal point in the male. Besides the three species given below, the following species from Patagonia and South Chile are to be placed here: *Spaniotoma* (*Orthocladius*) *hirtinervis, hamulata, heterogenea, obliqua,* all described by Edwards (1931). The New Zealand species *Chaetocladius harrisi* Freeman, 1959, also belongs here.

The Australian species show great variability and it is not improbable that both *terjugus* and *numerosus* as defined here are really composite. However, I have not found it possible to recognize any discrete entities in the material at my disposal.

KEY TO AUSTRALIAN SPECIES OF THE GENUS AUSTROCLADIUS

1. Squamal fringe short, hairs no longer than those of anal lobe of wing, anal lobe conspicuous, coxite lobe weak .... *terjugus* (Skuse)
   Squamal fringe including long hairs, anal lobe absent, coxite lobe conspicuous 2
2. Coxite lobe of medium size (Fig. 8, *b*), style of even width ....*numerosus* (Skuse)
   Coxite lobe large (Fig. 8, *c*) and almost free, style bulky ....*trichiatus*, sp. nov.

AUSTROCLADIUS TERJUGUS (Skuse), comb. nov.

Camptocladius terjugus Skuse, 1889, p. 262. Kieffer, 1906, p. 24; 1917, p. 228.

The cotype series of this species are all females, rather pale in colour and with sternopleural hairs present. In antennal structure they conform best with the commonest New South Wales species and it is to this one that I am referring the name. The species shows variability in structure, about half the specimens have sternopleural hairs and the wings of all males possess a strong anal lobe; the coxite lobe is not strong and the anal point is represented by a ridge. It is possibly a composite species but I have not been able satisfactorily to separate groups of specimens that can be regarded as representing distinct species.

Wing length.—1·5–2·5 mm.

Male.—*Head*, mouthparts, and antennae black or very dark brown, A.R. 1·75, extreme apex of antenna with short hairs. *Thorax* black with some grey dusting, dorsocentral bristles either uniserial or irregularly biserial, upper half of sternopleuron with as many as 8 long hairs in some specimens; in about half the specimens examined the sternopleuron is bare, even in specimens from the same localities. *Legs* dark brown, L.R. 0·75. *Wings* with clear microtrichia, anal lobe prominent and well formed, costa slightly produced, squama with complete fringe of comparatively short hairs, that is, of much the same length as fringe hairs of anal lobe of wing. Halteres black in most specimens. *Abdomen* black, hypopygium (Fig. 8, *a*) with anal point represented by a ridge on 9th tergite, coxite lobe not at all prominent, styles with sinuous inner margin.

Female.—Differing from male in paler colour of thorax which often has yellowish background, stripes dark; last antennal segment only slightly longer than preceding one.

Types.—I have seen the series of cotype females from near Sydney in the Macleay Museum and I have marked one specimen as lectotype.

Additional specimens seen.—NEW SOUTH WALES: Narrabeen and Hornsby, numerous specimens, W. W. Wirth and D. J. Lee; Yass, K. English, 11 ♂♂, 13 ♀♀ (all CSIRO). AUSTRALIAN CAPITAL TERRITORY: Blundell's, Sept. 1930, H. M. Barnes, 4 ♂♂, 5 ♀♀; Black Mountain, A. L. Tonnoir, 3 ♀♀, and I. F. B. Common, 10 ♂♂, 11 ♀♀ (all CSIRO). VICTORIA: Ringwood, Millgrove, Frankston, Kinglake, Cheltenham, Springvale, Bayswater, Bendigo, Hamilton, May–Aug. 1928 and 1929, F. E. Wilson, numerous specimens.

AUSTROCLADIUS NUMEROSUS (Skuse), comb. nov.

Orthocladius numerosus Skuse, 1889, p. 256. Kieffer, 1906, p. 28; and 1917, p. 228.

This species is very similar to *A. terjugus* and, like it, may have a patch of long hairs on the sternopleuron in some specimens. It is separable because the male wings have no anal lobe whilst the squama has a fringe of long hairs, some being twice as long as hairs of wing fringe. The male hypopygium (Fig. 8, *b*) has a definite coxite lobe, though variable in exact shape, the anal point is just present and the style more even in width.

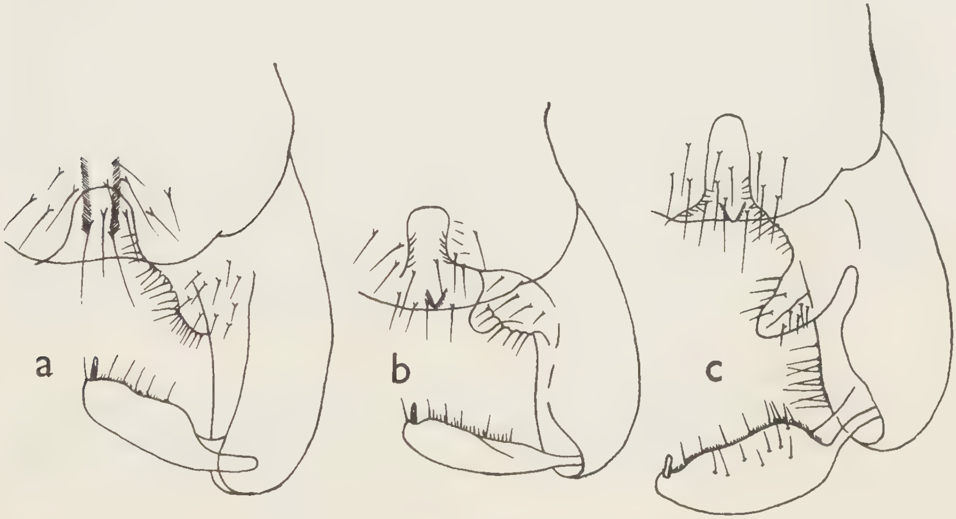

Fig. 8.—Male hypopygia of *Austrocladius*: *a*, *A. terjugus; b*, *A. numerosus; c*, *A. trichiatus.*

Types.—There are three cotype males from Lawson, N.S.W., in the Macleay Museum, one of which I have marked as lectotype.

Additional specimens seen.—NEW SOUTH WALES: Narrabeen, 8 ♂♂, 3 ♀♀, W. W. Wirth; National Park, W. W. Wirth, 1 ♂; E. Dorriga, W. Heron, 12 ♂♂, 2 ♀♀ (USNM); Mt. Kosciusko, Dec. 1931, 1 ♂, 2 ♀♀ (CSIRO). AUSTRALIAN CAPITAL TERRITORY: Black Mountain, May 1960, I. F. B. Common, 1 ♂ (CSIRO); Blundell's, A. L. Tonnoir, 2 ♂♂. VICTORIA: Eltham, Kilmore, Tyrendarra, Balnarring, Ringwood, Apr.–June 1929, F. E. Wilson, 7 ♂♂. TASMANIA: Mt. Wellington, A. L. Tonnoir, 1 ♂, 4 ♀♀.

AUSTROCLADIUS TRICHIATUS, sp. nov.

This species, of which only males are known, is similar to *A. terjugus* in colour, general structure, antennal and leg ratios, and in wing venation; both of the known specimens possess hairs on the upper part of the sternopleuron. The wings lack the anal lobe and possess a long squamal fringe as in *numerosus*. It is separable from both these species by the male hypopygium (Fig. 8, *c*) in which the coxite lobe is very prominent and almost free; the styles are bulky and with unusually conspicuous microtrichia all over (not shown in figure); anal point similar to *numerosus*.

Types.—Holotype ♂, Walhalla, Vic., Apr. 1930, F. E. Wilson, returned to NM. Paratype ♂, Healesville, Vic., Apr. 1929, F. E. Wilson, retained in BM.

Genus NASUTICLADIUS, gen. nov.

Type species *Nasuticladius tonnoiri*, sp. nov.

Eyes bare, dorsal narrow portion absent, apex of male antenna with short hairs only, female antenna with 6 or 7 segments; clypeus usually elongate so that there is a short proboscis. Prothorax reduced, acrostichal bristles present but minute and difficult to see. Pulvilli absent, outer spur of posterior tibia short, all tarsal segments cylindrical. Wings without macrotrichia on the membrane but with microtrichia which can be distinguished under a magnification of about ×500, not as large as in *Limnophyes*; costa very strongly produced, Cu_1 moderately bent, squama bare or fringed; wings often with strong pattern formed by areas of dark microtrichia. Hypopygium with anal point present.

The species being placed here do not form a compact group but a series; it is convenient to consider them as a single genus until more is known about them. The wing venation and microtrichiation, the acrostichal bristles, and the prothorax are very similar throughout. Of the five species known, two have plain wings and a short proboscis, two others have patterned wings and a short proboscis, and the remaining one, patterned wings and no proboscis; the male hypopygia are rather heterogeneous.

The patterned-winged species resemble species of *Stictocladius* at first sight but are easily separated by the bare eyes; the plain-winged species can be separated from *Austrocladius*, *Chaetocladius*, and other genera with distinguishable microtrichia on the wings by the reduced prothorax and by the presence of a short proboscis.

KEY TO AUSTRALIAN SPECIES OF THE GENUS NASUTICLADIUS

1.	Wings without dark markings	2
	Wings with dark markings	3
2.	Abdomen black, anal point bare (Fig. 10, *b*)	*niger*, sp. nov.
	Abdomen banded, anal point hairy (Fig. 10, *a*)	*tonnoiri*, sp. nov.
3.	Short proboscis present	4
	Proboscis absent, male hypopygium as in Figure 10, *d*, wings as in Figure 9, *d*	*wilsoni*, sp. nov.
4.	Wings more generally suffused (Fig. 9, *a*)	*ater*, sp. nov.
	Wing markings as in Figure 9, *b*	*wirthi*, sp. nov.

NASUTICLADIUS TONNOIRI, sp. nov.

Brown species, abdomen with yellow bands, wings unmarked, proboscis present; anal point not prominent, more in form of a ridge, spine at apex of style narrow; female antenna 7-segmented; squama fringed.

Wing length.—2·0 mm.

Male.—*Head* brown, clypeus elongate and forming a proboscis as long as head, A.R. about 1. *Thorax* brown, stripes more or less fused, margin and wing bases paler, dorsocentrals uniserial. *Legs* brown, L.R. 0·75. *Wings* unmarked, costa strongly produced and almost reaching M_{1+2}, crossvein fairly long and posterior fork well beyond it; squama with strong fringe, halteres pale. *Abdomen* brown, with broad yellow bands occupying apical halves of segments 2–5, segment 1 wholly yellow, segments 6, 7, and 8 with narrower pale bands; hypopygium (Fig. 10, *a*) with ridge-like anal point, coxite lobe simple, style with narrow apical spine.

Female.—Very similar to male but thoracic stripes separate, shoulders and background yellow; antennae with 7 segments, segments 3–6 with long narrow necks, each neck as long as oval basal bulb.

Types.—Holotype ♂ and 2 ♀ paratypes from Advent Bay, Tas., 31.xii.1922, A. L. Tonnoir; further ♂ paratype from Zehan, Tas., Feb. 1923, A. L. Tonnoir. Holotype and one paratype returned to SPHTM, two paratypes retained in BM.

NASUTICLADIUS NIGER, sp. nov.

In general structure, appearance, and wing venation very similar to *tonnoiri*, but differs in the all-black colour, paler markings being quite absent; the costa is not so strongly produced, only reaching about half-way to M_{1+2}, the squama is quite bare and the male hypopygium different (Fig. 10, *b*), the 9th tergite appearing to be quite bare and the style being of a different shape. These two species resemble each other in the absence of wing markings and in the presence of a short proboscis caused by the elongation of the clypeus.

Type.—Holotype ♂ from Eaglehawk Neck, Tas., 20.xi.1922, A. L. Tonnoir, returned to SPHTM.

NASUTICLADIUS ATER, sp. nov.

Black species, clypeus extended, female antenna 6-segmented, wings black with only base, apex, and part of fork cell clear. Only the female is known.

Wing length.—1·8–2·0 mm.

Female.—*Head* blackish, clypeus extended to form a well-developed short rostrum; antennae with 6 segments, segments 3–5 elongate but necks not as distinct from basal more swollen part as in *tonnoiri*. *Thorax* black, dorsocentral bristles irregularly biserial. *Legs* blackish, L.R. 0·6. *Wings* (Fig. 9, *a*) with heavy black pattern, the only pale areas being at tip, at base, and in and around fork cell; costa strongly produced, posterior fork below crossvein; squamal fringe absent, halteres black. *Abdomen* black.

Types.—Holotype ♀ and 3 ♀ paratypes from Eaglehawk Neck, Tas., 22.xi.1922, A. L. Tonnoir. Further paratypes: TASMANIA: Geeveston, Dec. 1922, A. L. Tonnoir, 2 ♀♀; Advent Bay, Dec. 1922, A. L. Tonnoir, 1 ♀; Cradle Valley, Jan. 1923, A. L. Tonnoir, 1 ♀. Three paratypes retained in BM, holotype and remainder of series returned to SPHTM.

NASUTICLADIUS WIRTHI, sp. nov.

Male black with yellow styles, female mainly orange; short proboscis present; wings with a broad transverse band and a spot in the anal cell; tibiae pale at the base; anal point triangular.

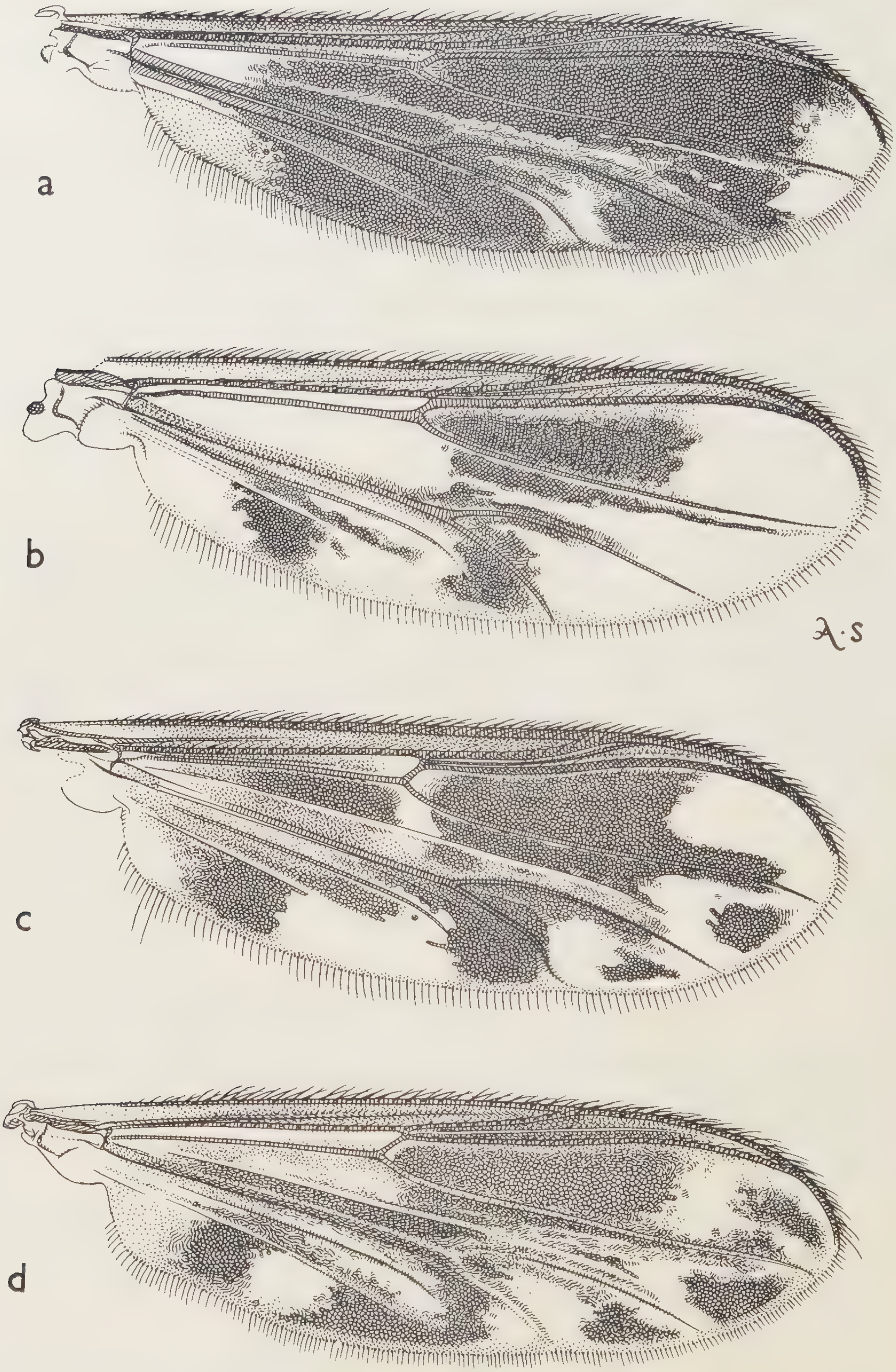

Fig. 9.—Wings of *Nasuticladius*: *a*, *N. ater*; *b*, *N. wirthi*; *c*, *N. wirthi* (? variety); *d*, *N. wilsoni*. Drawn by Mr. A. Smith.

Wing length.—1·5 mm.

Male.—*Head* blackish, face rather paler, clypeus slightly produced to form a short proboscis, not as long as in the three preceding species, A.R. 1. *Thorax* black, slightly pruinose when viewed from the front, matt when seen from behind, dorsocentral bristles irregularly biserial anteriorly, uniserial posteriorly. *Legs* dark brown, yellowish at bases of tibiae, L.R. 0·65. *Wings* (Fig. 9, *b*, of female) with broad, transverse dark band occupying rather more than basal half of cell R_5, narrower posteriorly, and with a spot in anal cell; squama fringed. *Abdomen* black, coxites and styles yellow; hypopygium (Fig. 10, *c*) with short, triangular, hairy anal point, styles of characteristic shape.

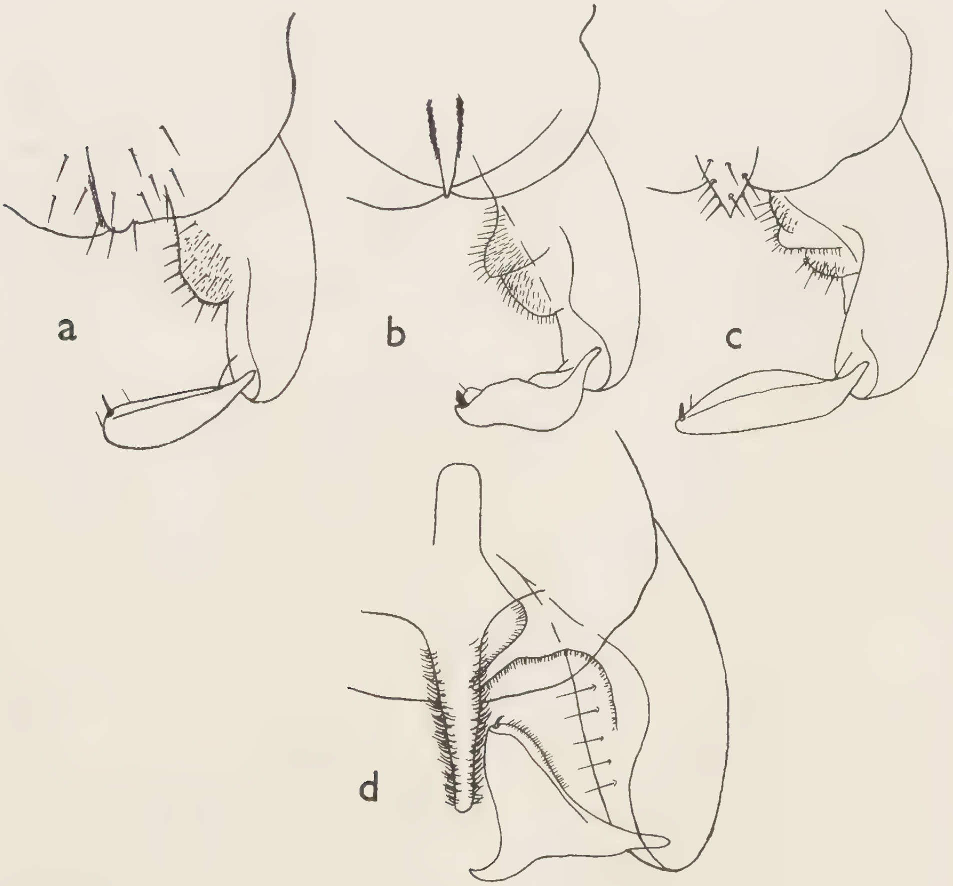

Fig. 10.—Male hypopygia of *Nasuticladius*: *a, N. tonnoiri; b, N. niger; c, N. wirthi; d, N. wilsoni.*

Female.—The single available specimen is much paler and mostly orange but with darker areas on shoulders, pleura, and some abdominal segments; antennae with 7 segments; wing pattern (Fig. 9, *b*) similar to male.

Types.—Holotype ♂ from Colo Vale, N.S.W., 16.x.1956, W. W. Wirth, returned to USNM. Paratype ♀ from Narrabeen, N.S.W., 27.x.1956, W. W. Wirth, retained in BM. In addition there are 3 ♀♀ from Hornsby and Mosman, N.S.W., structurally similar to the female paratype but with the male colouring and more extensive wing markings (Fig. 9, *c*). These are probably a variety, but until more specimens, including males, are known it is not possible to be certain.

NASUTICLADIUS WILSONI, sp. nov.

Brownish species, proboscis not present, wing markings extensive especially in female, antennae of female with 7 segments; male hypopygium highly characteristic, anal point long and densely hairy, style with outer thorn-like process. The absence of proboscis makes the inclusion of this species in the genus a matter of some doubt; it might be more satisfactory in a separate genus.

Wing length.—1·75–2·0 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. 1·5, eyes more reniform than usual. *Thorax* brown, yellowish between the stripes, dorsocentral bristles uniserial. *Legs* yellowish brown, femora darker on basal two-thirds, L.R. 0·8. *Wings* (Fig. 9, *d* of female) with conspicuous brownish black markings, perhaps not as extensive as in female but very similar in positioning of spots; basal two-thirds of cell R_5 occupied by a large dark area, other especially noticeable spots are below apices of M_{1+2} and M_{3+4}, across *Cu*, and in anal cell; squama fringed, halteres yellow. *Abdomen* blackish, claspers yellowish; hypopygium (Fig. 10, *d*) quite unlike any other species; anal point long, stout, and densely pubescent, coxite with long narrow lobe, style broad with small apical spine and stout, outer, blackened, thorn-like process.

Female.—Similar to male in colour although wing markings (Fig. 9, *d*) more intense and extensive. Antennae 7-segmented, intermediate segments with well-formed necks about equal in length to basal bulbs, dorsocentrals irregularly biserial, cerci yellowish.

Types.—Holotype ♂ and 1 ♀ paratype from Walhalla, Vic., Apr. 1930, F. E. Wilson, and 1 ♂ paratype from Healesville, Vic., Apr. 1930, F. E. Wilson. Male paratype retained in BM, holotype and other paratype returned to NM.

Genus LIMNOPHYES Eaton

Limnophyes Eaton, 1875, p. 60. Edwards, 1929, p. 354 (as subgenus of *Spaniotoma*) Freeman, 1956, p. 344. Brundin, 1956, p. 131.

Type species *Limnophyes pusillus* Eaton, 1875.

Eyes bare, antennae without straight apical bristle, plume hairs reaching to apex. Pronotum very strongly developed; acrostichal bristles absent, dorsocentrals often including narrow scale-like hairs. Wings without macrotrichia but with very strong and clear microtrichia, anal lobe obtuse, squama with incomplete fringe of 2–6 hairs, Cu_1 strongly bent. Pulvilli absent.

KEY TO AUSTRALIAN SPECIES OF THE GENUS LIMNOPHYES

1. Halteres black, body colour black 2
   Halteres yellow or brown, body paler .... *vestitus* (Skuse)
2. Base of wing strikingly white; thorax shining; male style with spine at apex (Fig. 11, *b*) .... *albibasis*, sp. nov.
   Base of wing may be slightly paler but not strikingly white; thorax slightly dusted; spine placed subapically on style .... *pullulus* (Skuse)

LIMNOPHYES PULLULUS (Skuse), comb. nov.

Orthocladius pullulus Skuse, 1889, p. 259. Kieffer, 1906, p. 28; 1917, p. 228.

A small black species; base of wing greyish, not strikingly white; thorax black, halteres black; male hypopygium with spine placed subapically, anal point well developed.

Wing length.—1·2–1·6 mm.

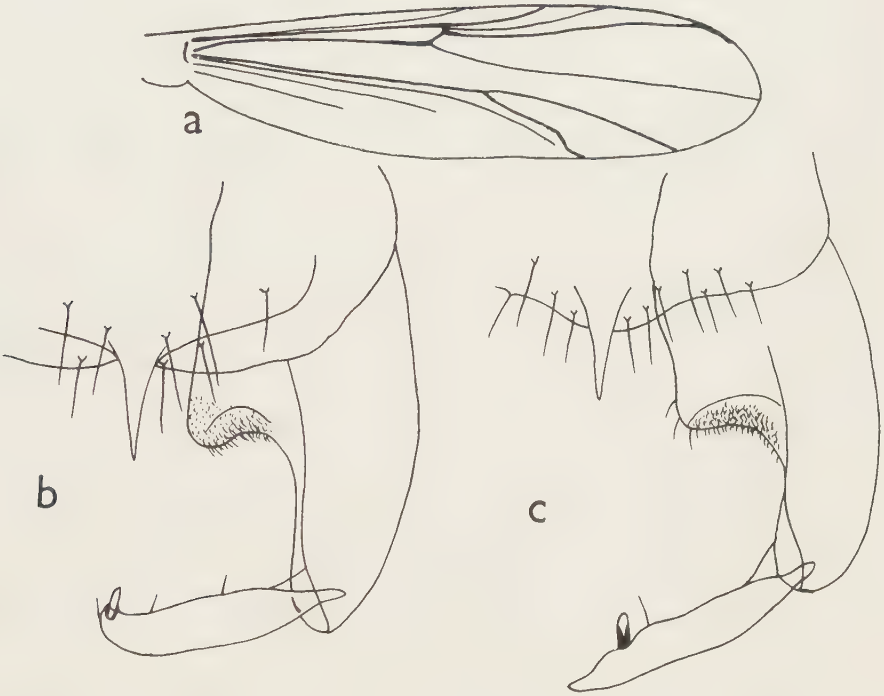

Fig. 11.—*Limnophyes*: *a,* wing of male *L. albibasis; b,* male hypopygium of *L. albibasis; c,* hypopygium of *L. pullulus.*

Male.—*Head,* mouthparts, and antennae black, A.R. about 0·5. *Thorax* completely black and slightly dusted, dorsocentral hairs long, black, and uniserial, acrostichals absent. *Legs* blackish or dark brown, trochanters yellowish, L.R. about 0·5, pulvilli and beard absent. *Wings* very slightly smoky, at base rather paler but not strikingly so, squama with 4–5 long hairs; microtrichia dense and easily distinguished; venation as in *albibasis* (Fig. 11, *a*). Halteres black. *Abdomen* black and with black hairs; hypopygium (Fig. 11, *c*) with well-formed, bare, anal point, 9th tergite hairy apically, coxite lobe more or less right-angled, styles with apical projection so that spine is subapical.

Female.—Resembles male in colour, as usual wings rather broader.

Type.—Holotype ♀ from Sydney (MM) (seen by author).

Additional specimens seen.—NEW SOUTH WALES: Hornsby, Jan. 1958, D. J. Lee, 3 ♂♂; Narrabeen, Oct. 1956, W. W. Wirth, 1 ♀; Griffith, Nov. 1956, W. W. Wirth, 11 ♂♂. VICTORIA: Melbourne, 1 ♂ (NM). WESTERN AUSTRALIA: Lake Gwellup, Sept. 1958, 7 ♂♂, 6 ♀♀, and Muchea, June 1958, 1 ♂, D. H. Edward.

LIMNOPHYES ALBIBASIS, sp. nov.

In size, general colour, and structure this species is similar to *pullulus* but it differs as follows: (1) wings more definitely smoky and with bases strikingly white, venation as in Figure 11, *a*, squamal fringe reduced to 1–2 hairs; (2) thorax shining black; (3) male styles not prolonged at apex, spine apical (Fig. 11, *b*).

Types.—Holotype ♂ and 5 ♀ paratypes from National Park, N.S.W., Aug. 1953, E. J. Reye (SPHTM). Further paratypes: NEW SOUTH WALES: Belmore Falls, Oct. 1938, A. L. Tonnoir, 1 ♂ (CSIRO); Chatswood, A. Dyce, 2 ♀♀ (CSIRO); Mona Vale, Sept. 1956, 1 ♂, 12 ♀♀, W. W. Wirth; Narrabeen, Sept.–Dec. 1956, W. W. Wirth, 2 ♂♂, 1 ♀; Hornsby, 1 ♂, D. J. Lee, and 1 ♀, W. W. Wirth; Colo Vale, March 1957, W. W. Wirth, 1 ♂. AUSTRALIAN CAPITAL TERRITORY: Shannon Creek, Nov. 1938, A. L. Tonnoir, 1 ♂. TASMANIA: Burnie, Jan. 1923, A. L. Tonnoir, 1 ♂, 2 ♀♀. Nine paratypes retained in BM, holotype returned to SPHTM, other specimens returned to CSIRO, SPHTM, and USNM.

LIMNOPHYES VESTITUS (Skuse), comb. nov.

Camptocladius vestitus Skuse, 1889, p. 263. Kieffer, 1906, p. 24; 1917, p. 228.

Only two cotype females of this species are known for certainty; two other females from Blundell's, A.C.T., may belong here but I am not convinced of their identity. No males are known. It is a pale yellowish brown species with darker, separate, thoracic stripes and pale halteres; the wing venation is similar to *albibasis*.

Wing length.—1·3 mm.

Female.—*Head*, mouthparts, and antennae brown. *Thorax* yellowish; stripes, postnotum, and sternopleuron brown, stripes separate, bristles pale. *Legs* brown, L.R. about 0·5. *Wings* similar to *pullulus* and *albibasis* but not smoky and base hardly paler, squama with 2 hairs. *Abdomen* brown.

Types.—I have seen the two cotype ♀♀ from Elizabeth Bay, near Sydney, which are in the Macleay Museum and I have selected one as lectotype.

Genus METRIOCNEMUS van der Wulp

Metriocnemus van der Wulp, 1874, p. 136. Edwards, 1929, p. 310 (in part). Freeman, 1956, p. 294 (in part). Brundin, 1956, p. 132.

Type species *Chironomus albolineatus* Meigen (as fixed by Coquillett).

Body hairs very strongly developed; eyes bare; pronotum of normal development. Acrostichal bristles strongly developed, dorsocentrals often in 2 or 3 rows; wings thickly clothed with macrotrichia, squama with long hair fringe; pulvilli absent; costa produced, posterior fork beyond *r-m*; anal point of male hypopygium without hairs.

The type species was described by Meigen from a mixed series belonging to more than one genus and as no one knows what van der Wulp really understood by this name, it was therefore proposed by Edwards (1929, p. 310) that *fuscipes* Meigen would make a more satisfactory type species. It is in this sense that Brundin has used the genus and this is the usage employed in this paper. The important features of the genus are the presence of dense wing macrotrichia combined with strong acrostichal hairs.

METRIOCNEMUS HORNSBYENSIS, sp. nov.

A small black species with long macrotrichia; A.R. 1; anal point of male in form of a ridge.

Wing length.—1·0 mm.

Male.—*Head*, mouthparts, and antennae blackish, A.R. about 1, extreme apex of antenna with short hairs. *Thorax* black, slightly pruinose, dorsocentral bristles long and uniserial. *Legs* dark brown, L.R. of front legs about 0·6. *Wings* with venation as in Figure 12, *a*; R_{2+3} absent, costa produced but retracted from tip of wing, anal lobe absent, squama fringed, whole wing covered by dark macrotrichia.

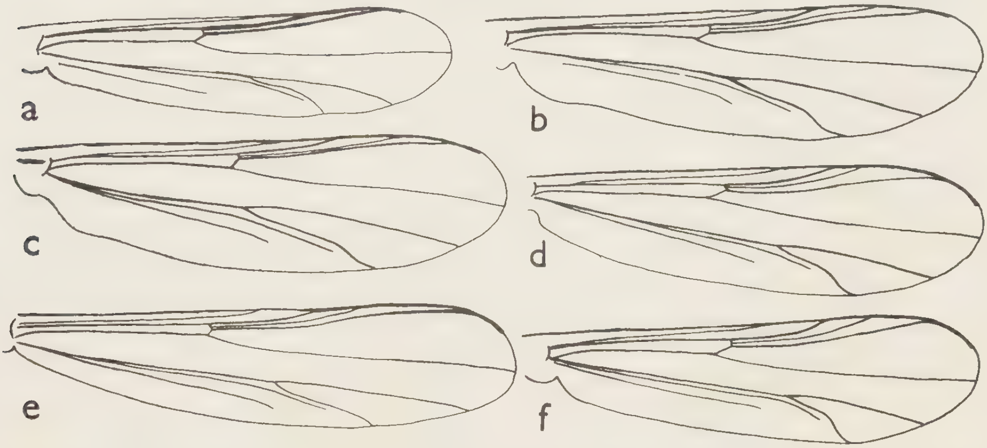

Fig. 12.—Wings of Orthocladiinae: *a, Metriocnemus hornsbyensis; b, Allometriocnemus coloensis; c, Parametriocnemus ornaticornis; d, Gymnometriocnemus nitidulus; e, G. wilsoni; f, G. pectinatus.*

Abdomen black, clothed with long dark hair; hypopygium (Fig. 13, *a*), 9th tergite with central ridge representing anal point, coxite lobe moderately developed, style slightly produced at apex.

Type.—Holotype ♂ from Hornsby, N.S.W., 6.i.1958, D. J. Lee, returned to SPHTM.

Genus ALLOMETRIOCNEMUS, gen. nov.

Type species *Allometriocnemus coloensis*, sp. nov.

Eyes bare, dorsal narrow portion not developed, male antenna with only short hair on apical eighth, mouthparts fully developed. Prothorax reduced centrally, dorsocentral bristles long and well developed, acrostichals completely absent. Outer spur of posterior tibia less than half length of inner, pulvilli absent. Venation as in Figure 12, *b*, costa produced and rather retracted, R_{2+3} ending half-way between R_1 and R_{4+5}, Cu_1 curved; squama with strong complete fringe; macrotrichia present on wing membrane at apex only. Hypopygium of type species lacking definite anal point which is represented by a ridge; 9th tergite with well-developed hairs.

The type species resembles *Metriocnemus*, s.s., in many respects but differs in the complete absence of acrostichal bristles; also the wing macrotrichia are greatly reduced. The second species which is known only from the female, resembles *coloensis* in its main features but differs in the possession of a strong wing pattern.

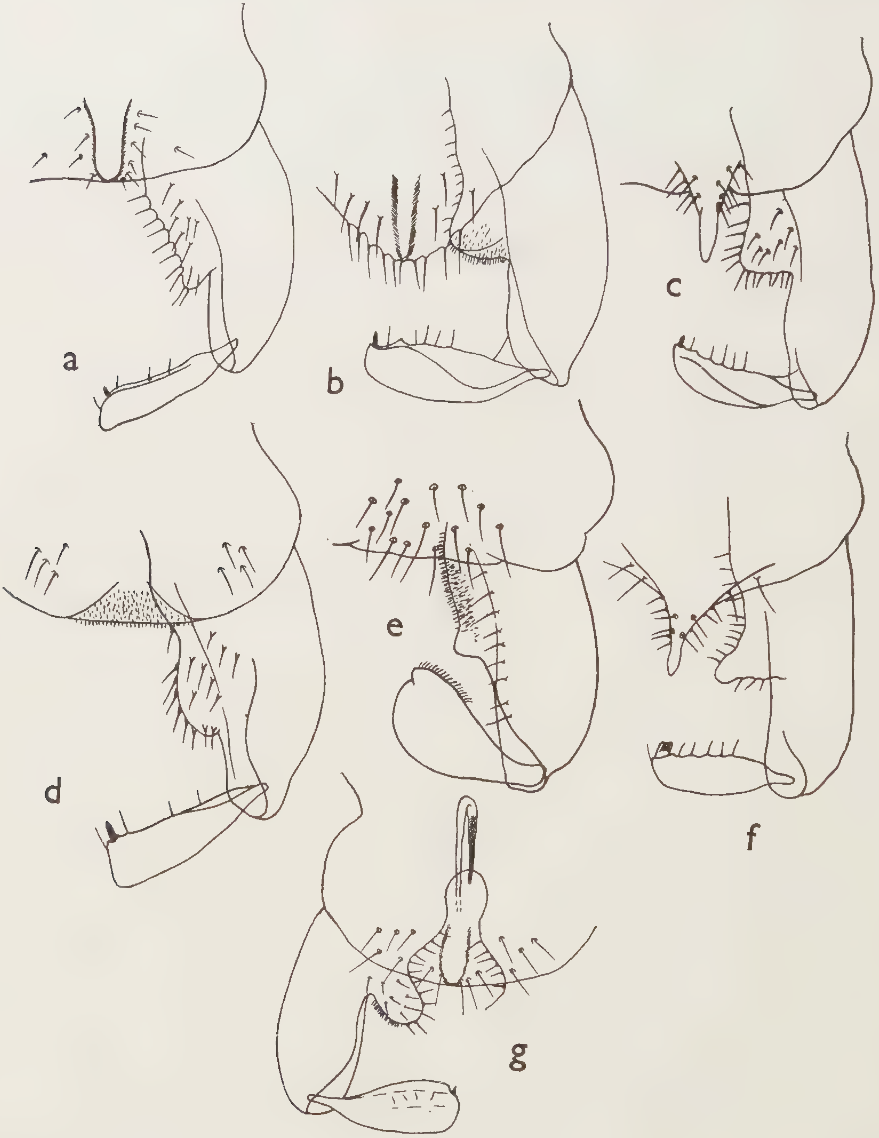

Fig. 13.—Male hypopygia of: *a*, *Metriocnemus hornsbyensis; b*, *Allometriocnemus coloensis; c*, *Parametriocnemus ornaticornis; d*, *Gymnometriocnemus wilsoni; e*, *G. nitidulus; f*, *G. pectinatus; g*, *Rhinocladius tonnoiri*.

KEY TO AUSTRALIAN SPECIES OF THE GENUS ALLOMETRIOCNEMUS

Wings plain, unmarked (Fig. 12, *b*) ....*coloensis*, sp. nov.
Wings with strong pattern (Fig. 6, *a*) ....*pictus*, sp. nov.

ALLOMETRIOCNEMUS COLOENSIS, sp. nov.

An all-black species resembling *Metriocnemus* in its strictest sense. Wings with yellowish brown tinge, macrotrichia present only at extreme apex in male.

Wing length.—1·8 mm.

Male.—*Head,* mouthparts, and antennae black, A.R. about 1·2. *Thorax* completely black, rather shining, but dorsally with slight changeable pruinosity; dorsocentral bristles long and black, biserial anteriorly, uniserial posteriorly. *Legs* black, pulvilli absent but empodium well formed; tibiae with long hairs, anterior and posterior L.R. about 0·5. *Wings* (Fig. 12, *b*) without anal lobe, macrotrichia present only as a patch at extreme apex of cell R_5 and as a row inside margin of cell M_2; costa produced, R_{4+5} ending opposite apex of M_{3+4}; squama with strong fringe of long black hairs; halteres black. *Abdomen* black and with black hairs. Hypopygium (Fig. 13, *b*) lacking proper anal point which is represented by a ridge, 9th tergite hairy, coxite lobe well formed.

Types.—Holotype ♂ and 3 ♂ paratypes from Colo Vale, N.S.W., 17.i.1957, W. W. Wirth. One paratype retained in BM, holotype and other two specimens returned to USNM.

ALLOMETRIOCNEMUS PICTUS, sp. nov.

Black species, wing heavily patterned, macrotrichia present at apex only.

Wing length.—1·5 mm.

Female.—*Head,* mouthparts, and antennae black, eyes widely separated, antennae with 6 segments, last segment about as long as preceding two together, which have short necks, hairs on last segment short. *Thorax* black, rather shining, slightly dusted in certain lights, dorsocentrals biserial. *Legs* blackish, anterior L.R. about 0·5, posterior 0·6. *Wings* (Fig. 6, *a*) heavily patterned with black, costa produced, posterior fork below crossvein, squama with complete fringe, macrotrichia present at extreme apices of cells R_5 and M_2; halteres black. *Abdomen* black.

Types.—Holotype ♀ and 6 ♀ paratypes from Colo Vale, N.S.W., 15.viii.1957, W. W. Wirth. Two paratypes retained in BM, holotype and remainder returned to USNM.

Genus PARAMETRIOCNEMUS Goetghebuer

Parametriocnemus Goetghebuer, 1932, p. 22. Brundin, 1956, p. 135.
Metriocnemus Edwards, 1929, p. 310 (in part). Freeman, 1956, p. 294 (in part).

Type species *Metriocnemus stylatus* Kieffer, 1924.

Eyes bare, dorsal narrow portion well developed, last antennal segment with no apical bristle but with short straight hairs and 3 or 4 long curled hairs near the tip. Pronotum normally developed, acrostichal bristles present. Wings with macrotrichia over most of surface, squama with partial fringe; costa strongly produced, R_{4+5} rather retracted; pulvilli absent. Anal point strong and hairy.

The main feature distinguishing this genus from related ones is the presence of well-formed, dorsal, narrow portions to the eyes. The single Australian species known to the author is extremely similar to the type species.

PARAMETRIOCNEMUS ORNATICORNIS (Kieffer), comb. nov.

Metriocnemus ornaticornis Kieffer, 1917, p. 225.

Very similar to the Palaearctic species *stylatus* Kieffer but smaller and with shorter leg ratio; yellowish brown, scutal stripes separate and darker, venation and hypopygium as in figures.

Wing length.—1·5 mm.

Male.—*Head* and mouthparts yellowish brown, antennae brown, flagellum slightly clubbed, with short straight hairs at extreme apex and 3–4 long curled hairs near the tip. *Thorax* yellowish brown, stripes, postnotum and sternopleuron dark brown. *Legs* brown, empodium well formed, front L.R. 0·75, hind L.R. 0·6. *Wings* with venation as in Figure 12, *c*; macrotrichia less dense in basal half of wing, tending to form lines along veins; halteres pale. *Abdomen* yellowish brown, hypopygium (Fig. 13, *c*) very similar to *stylatus*, anal point hairy but apex bare.

Female.—Not known to author, but from Kieffer's description similar to male; last antennal segment rather short but with the same curved hairs.

Type.—The type series from Sydney was in the Hungarian National Museum and is now presumed destroyed. Kieffer's figures make the identification almost certain without seeing type specimens.

Specimens seen.—NEW SOUTH WALES: Narrabeen, Oct.–Nov. 1956, W. W. Wirth, 2 ♂♂. AUSTRALIAN CAPITAL TERRITORY: Canberra, Nov. 1929, A. L. Tonnoir, 1 ♂. WESTERN AUSTRALIA: Millstream Station, July 1958, J. A. L. Watson, 2 ♂♂.

Genus GYMNOMETRIOCNEMUS Goetghebuer

Gymnometriocnemus Goetghebuer, 1932, p. 23. Brundin, 1956, p. 140.

Metriocnemus Edwards, 1929, p. 310 (in part). Freeman, 1956, p. 294 (in part).

Type species *Metriocnemus subnudus* Edwards, 1929.

Eyes bare, dorsal narrow portion not developed; acrostichal bristles completely absent, squama bare or at most with 1–3 hairs; costa strongly produced, posterior fork well distal to crossvein; macrotrichia tending to be present only at apex of wing in male; anal point not developed in most species.

Using the key to genera given by Brundin (1956) the three species below run out to this genus, but not all fit it completely satisfactorily. All agree in having no acrostichal bristles but one species has 1–3 bristles on the squama and another has a well-developed anal point, necessitating slight modification of the definition. I prefer to do this and not to separate them off as distinct genera until more is known of the generic limits in this part of the family. The South Chilean species *M. longicostalis* Edwards and *M. ancudensis* Edwards similarly belong here.

Key to Australian Species of the Genus Gymnometriocnemus

1. Macrotrichia confined to extreme apex of wing in male, anal point present, spine of style pectinate (Fig. 13, *f*) .... *pectinatus,* sp. nov.
   Macrotrichia present at least in apical half of cell R_{4+5}, anal point absent, spine simple 2
2. Squama bare, blackish species, style with spine (Fig. 13, *d*) .... *wilsoni,* sp. nov.
   Squama with 1–3 hairs, yellowish species, style lacking spine (Fig. 13, *e*) .... *nitidulus* (Skuse)

Gymnometriocnemus wilsoni, sp. nov.

Blackish species, antennae of male with short plume hairs right to extreme apex, L.R. 0·6, macrotrichia present over most of wing surface, squama quite bare, male style right-angled at apex. This species is very similar indeed to *longicostalis* from Chile but it is darker and shows slight hypopygial differences.

Wing length.—1·5 mm.

Male.—*Head*, mouthparts, and antennae dark brown, A.R. about 1·0, plume hairs present right to apex, which lacks close-set fine hairs. *Thorax* blackish brown, paler along lateral margins and on scutellum; acrostichal bristles absent, dorsocentrals irregularly biserial. *Legs* brown, L.R. of both front and hind legs about 0·6, tibial hairs long on mid and hind legs. *Wings* with venation as in Figure 12, *e*, costa strongly produced, posterior fork the longest of the three species, crossvein short, squama bare, macrotrichia present over most of surface, halteres dark. *Abdomen* blackish, hypopygium (Fig. 13, *d*) lacking anal point, macrotrichia on 9th tergite at sides only, coxite lobe oval and with fairly strong hairs, style right-angled at apex.

Type.—Holotype ♂ from Hamilton, Vic., 29.vi.1930, F. E. Wilson, returned to NM.

Gymnometriocnemus nitidulus (Skuse), comb. nov.

Metriocnemus nitidulus Skuse, 1889, p. 276. Kieffer, 1906, p. 32; 1917, p. 225.

Pale, yellowish species, apex of male antenna with close-set short hairs, macrotrichia confined to apical half of wing in male, crossvein long, squama with 1–3 hairs, anal point absent, styles of unusual shape and without spine at apex.

Wing length.—1–1·4 mm.

Male.—*Head*, mouthparts, and antennae yellowish, A.R. about 1·1, plume hairs not going to extreme apex of antenna where there are close-set short hairs. *Thorax* yellowish, acrostichal bristles absent, dorsocentrals uniserial. *Legs* yellow, front and hind L.R. 0·75, hairs of mid and hind tibiae not unduly long. *Wings* with venation as in Figure 12, *d*, costa strongly produced, crossvein fairly long, posterior fork short, squama with 1–3 hairs, macrotrichia confined to apical half of wing, halteres yellow. *Abdomen* yellow, hypopygium (Fig. 13, *e*) lacking anal point, 9th tergite with hairs, coxite lobe slight, style of unusual shape, spine absent.

Female.—Similar to male, except that wing macrotrichia are more numerous.

Types.—I have seen the type series of 5 ♀♀ from Sydney which is in the Macleay Museum and I have selected one as lectotype.

Additional specimen seen.—E. Dorrigo, N.S.W., 26.v.1927, W. Heron, 1 ♂ (USNM).

GYMNOMETRIOCNEMUS PECTINATUS, sp. nov.

Greyish brown species, shoulders yellowish, apex of antenna with short close-set hairs, squama bare, macrotrichia confined to extreme apex of wing in male, anal point present, spine of style compound.

Wing length.—1·3 mm.

Male.—*Head,* mouthparts, and antennae brown, apex of antenna with close-set short hairs, A.R. about 0·9. *Thorax* with greyish brown stripes, postnotum and sternopleuron which are set on a more yellowish background; dorsocentral bristles uniserial. *Legs* yellowish, L.R. of front legs 0·75, of hind legs 0·6, tibial hairs not long. *Wings* with venation as in Figure 12, *f,* costa produced, crossvein fairly long, posterior fork short, squama bare, macrotrichia confined to extreme apex, halteres yellow. *Abdomen* brown, hypopygium (Fig. 13, *f*) with strong and hairy anal point, coxite lobe well formed, spine at apex of style compound and pectinate.

Type.—Holotype ♂ from Newport, N.S.W., 9.xii.1956, W. W. Wirth; paratypes: Mosman, N.S.W., 9.iii.1957, W. W. Wirth, 5 ♂♂. Two paratypes retained in BM, holotype and remainder returned to USNM.

Genus RHINOCLADIUS Edwards

Rhinocladius Edwards, 1931, p. 268.

Type species *Rhinocladius culicinus* Edwards, 1929.

Eyes bare and without dorsal narrow portions; palpi reduced and apparently 3-segmented, labella greatly elongated to form a sucking tube, sometimes nearly as long as the whole body; female antenna with 7 segments. Prothorax collar-like, acrostichal bristles absent. Outer spur of hind tibia less than half as long as inner, pulvilli absent. Wings with macrotrichia on membrane, R_{2+3} meeting costa before mid-point of distance between R_1 and R_{4+5}, costa very strongly produced, squama fringed. Hypopygium with internal sclerotized hook, anal point ridge-like.

The genus was described for two species from Patagonia and South Chile, no other species are known and it is thus of especial interest to find a third in Australia. The exact affinities of the genus are not clear to the author.

RHINOCLADIUS TONNOIRI, sp. nov.

A dark brown or blackish species with greatly elongated mouthparts; very similar to *R. longirostris* Edwards from which it may be separated by the larger coxite lobe of the male hypopygium and by the more slender legs.

Wing length.—2–2·75 mm.

Male.—*Head,* mouthparts, and antennae dark brown, palpi short, proboscis longer than anterior femur, A.R. about 0·8. *Thorax* dark brown or blackish, dorsocentrals uniserial. *Legs* brown and slender, L.R. 0·75, tibiae without long hairs. *Wings* similar to *longirostris,* with well-developed macrotrichia in apical half and in anal cell, costa very strongly produced, Cu_1 curved, *An* reaching just beyond posterior fork; squama fringed. *Abdomen* dark brown, hypopygium (Fig. 13, *g*) quite similar to *longirostris,* similarly possessing internal hook, but coxite lobe larger and more prominent, anal point represented by a ridge, styles flanged along inner margin.

Types.—Holotype ♂ and 1 ♂ paratype from Mt. Wellington, Tas., Nov. 1922, A. L. Tonnoir; further paratype: Belgrave, Vic., Sept. 1928, F. E. Wilson, 1 ♂. Holotype returned to SPHTM, Tasmania paratype retained in BM, other specimen returned to NM.

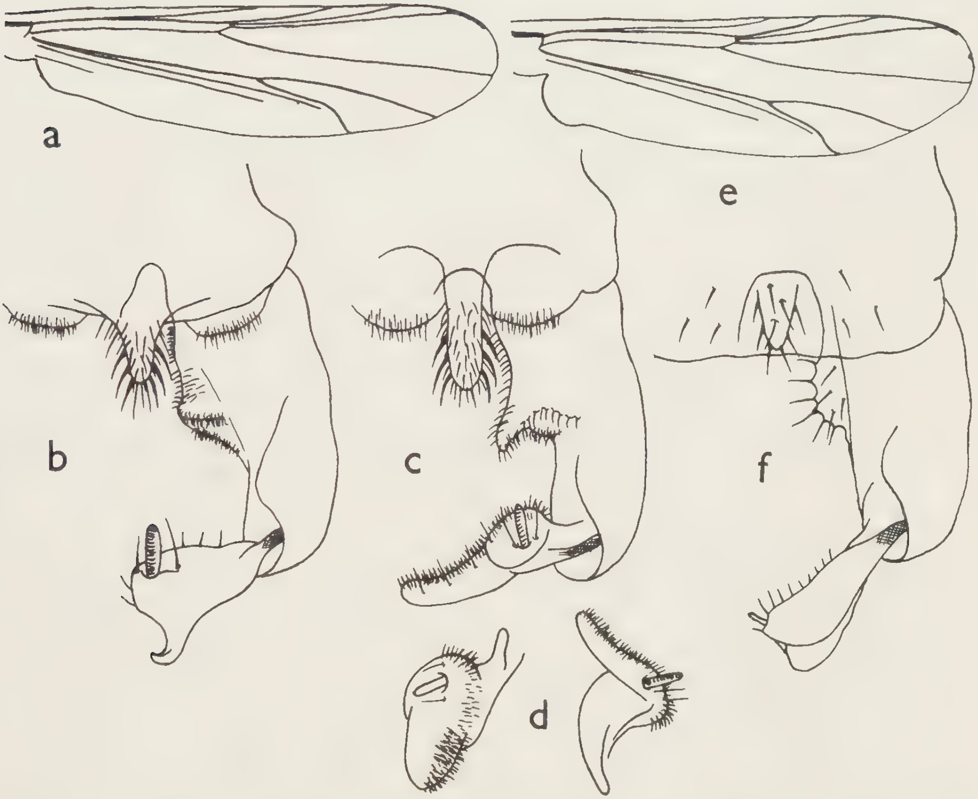

Fig. 14.—Wings and hypopygia of males of *Kiefferophyes*: *a* and *b*, *K. invenustulus; c, K. lobifer; d,* styles of another specimen of *lobifer* from different aspects; *e* and *f*, *K. leei.*

Genus KIEFFEROPHYES, gen. nov.

Type species *Camptocladius invenustulus* Skuse, 1889

Eyes bare, dorsal narrow portion not developed, antennae of male slightly clubbed at apex which carries short hairs only, vertex bristles present laterally only. Pronotum of normal size or rather reduced; acrostichal bristles quite absent, dorsocentrals present. Wings with no macrotrichia, finely punctate but microtrichia not clearly visible, anal lobe present or not developed, squama with 1–2 hairs; costa strongly produced, R_{2+3} reaching costa about mid-way between R_1 and R_{4+5}, posterior fork beyond crossvein, *Cu* strongly bent, *An* ending opposite crossvein. Hypopygium with broad, hairy, anal point (Fig. 14, *b, c, f*), styles tending to have an outwardly produced lobe near apex.

Superficially, this genus resembles a number of others, but there are sufficient characters separating it for it to be considered distinct. The venation closely resembles that of *Pseudorthocladius*, but acrostichal hairs are quite absent and the apex of the antenna bears short hairs only. Although the male hypopygium calls to mind species of *Limnophyes*, the prothorax is reduced and the wing microtrichia too small for that genus. It can be distinguished from *Eukiefferiella* and *Parakiefferiella* by the vein R_{2+3} ending separately in the costa and by the strongly bent *Cu*. It is only known from Australian species.

KEY TO AUSTRALIAN SPECIES OF THE GENUS KIEFFEROPHYES

1. Posterior fork short, costa less produced, anal lobe stronger (Fig. 14, *e*) ....*leei*, sp. nov.
   Posterior fork longer, costa more produced, anal lobe reduced (Fig. 14, *a*) 2
2. Male style with hook-like apical process (Fig. 14, *b*) ....*invenustulus* (Skuse)
   Male style with broad apical process (Fig. 14, *c*) ....*lobifer*, sp. nov.

KIEFFEROPHYES INVENUSTULUS (Skuse), comb. nov.

Camptocladius invenustulus Skuse, 1889, p. 265. Kieffer, 1917, p. 228.

Camptocladius investulus Kieffer, 1906, p. 24 (*lapsus calami*).

A small species, usually dark in colour but browner specimens do occur, costa strongly produced, posterior fork long, squama with a single hair, anal lobe reduced, anal point of male broad, style with a thorn-like process on outer angle near apex.

Wing length.—0·8–1·2 mm.

Male.—*Head*, mouthparts, and antennae black or brown, A.R. about 0·8. *Thorax* blackish or brown, paler at sides of scutum and on shoulders, dorsocentral bristles uniserial. *Legs* brown, L.R. about 0·6. *Wings* with venation as shown in Figure 14, *a*, costa strongly produced, anal lobe reduced, squama usually with a single hair; halteres pale brown. *Abdomen* blackish, hypopygium (Fig. 14, *b*) with broad hairy anal point, which carries 3 pairs of stout setae in addition to finer ones; coxite lobe with short setae, rather obtuse, outer apical process of style thorn-like, apical spine large; the style process may be smaller than shown, in some specimens.

Female.—Very small and dark but essentially similar to male, costa very strongly produced, almost reaching M_{1+2}; the holotype has 2 hairs on the squama, but most specimens have only 1.

Type.—Holotype ♀ from Knapsack Gully, N.S.W. (MM) (seen by author).

Additional specimens seen.—NEW SOUTH WALES: Hornsby, D. J. Lee, 10 ♂♂, 7 ♀♀; Narrabeen, W. W. Wirth, Sept.–Oct. 1956, 2 ♂♂; Careel Bay, Sept. 1956, W. W. Wirth, 3 ♂♂. VICTORIA: Millgrove, 3.ix.1929, F. E. Wilson, 3 ♂♂. TASMANIA: Cradle Valley, Jan. 1923, A. Tonnoir, 3 ♂♂, 1 ♀.

KIEFFEROPHYES LOBIFER, sp. nov.

Extremely similar to *invenustulus* in external appearance, only to be separated by the structure of the male hypopygium (Fig. 14, *c*) in which the anal point is rather longer, the coxite lobe more produced at the apex, and the style bears a broad flattened lobe at the apex (Fig. 14, *c* and *d*).

Types.—Holotype ♂, "Victoria", G. French, in BM. Paratypes: Bogong Plains, Vic., Jan. 1928, F. E. Wilson, 8 ♂♂ (NM).

KIEFFEROPHYES LEEI, sp. nov.

Blackish species, anal lobe of wings distinct, costa less strongly produced than in other species; anal point lacking strong hairs, style more broadly produced outwardly.

Wing length.—1·0 mm.

Male.—*Head*, mouthparts, and antennae blackish, A.R. about 1·0. *Thorax* black, acrostichal bristles quite absent, dorsocentrals long and uniserial. *Legs* brown, anterior pair broken. *Wings* (Fig. 14, *e*) with distinct anal lobe, squama with a single hair; costa less produced than in other two species, posterior fork shorter; halteres brown. *Abdomen* black, hypopygium as in Figure 14, *f*; anal point short and hairy, but setae fewer and less stout than in other two species, coxite lobe moderate, style with outer broad lobe.

Female.—Not known.

Type.—Holotype ♂ from Hornsby, N.S.W., 6.i.1958, D. J. Lee, returned to SPHTM.

Genus SMITTIA Holmgren

Smittia Holmgren, 1869, p. 47. Brundin, 1956, p. 146.

Camptocladius Skuse, 1889, p. 261 (in part).

Spaniotoma, subgenus *Smittia* Group B Edwards, 1929, p. 360.

Type species *Smittia brevipennis* Holmgren.

Edwards used this name for all the species of his genus *Spaniotoma* which lacked particular venational characters but had a bare squama. I am now following Brundin in restricting it to those species with bare squama, bent *Cu*, and with a stout bristle at the tip of the antenna.

KEY TO AUSTRALIAN SPECIES OF THE GENUS SMITTIA

1. Costa produced, R_{4+5} ending beyond level of apex of M_{3+4} 2
   Costa not produced, R_{4+5} ending before this level .... *retracta*, sp. nov.
2. Eyes finely pubescent .... *aterrima* (Meigen)
   Eyes bare .... *wirthi*, sp. nov.

SMITTIA ATERRIMA (Meigen)

Chironomus aterrimus Meigen, 1818, p. 47.

Camptocladius macleayi Skuse, 1889, p. 266. Kieffer, 1906, p. 24; 1917, p. 228 (syn. nov.).

Smittia atra Freeman, 1954*a*, p. 175; 1956, p. 348 (syn. nov.).

Smittia aterrima Brundin, 1956, pp. 146–7.

Australian specimens are exactly similar to this common European species and I can see no valid reason for maintaining them as separate. I have taken this opportunity of re-examining African specimens described by me as *atra* and likewise can find no real difference.

Eyes finely pubescent, thorax black, costa slightly produced, anal lobe of wing present but not prominent, anal point of male bare, style with prominent inner flange.

Wing length.—1·5–2·0 mm.

Male.—*Head*, mouthparts, and antennae black, eyes finely pubescent, A.R. about 1·5, apex of antenna with short hairs and a single stout bristle. *Thorax* all black, slightly shining and with some pruinosity, dorsocentrals uniserial, acrostichals absent. *Legs* brown and with fairly long pubescence on posterior tibiae, hairs about 4 times width of tibia, L.R. 0·6, pulvilli absent. *Wings* (Fig. 15, *a*) milky, costa produced, *Cu* bent, *An* reaching beyond fork and bent down at apex, anal lobe distinct but not large; halteres dark brown. *Abdomen* black, hypopygium (Fig. 15, *b*) with bare anal point, 9th tergite with a few hairs, style with strong inner flange.

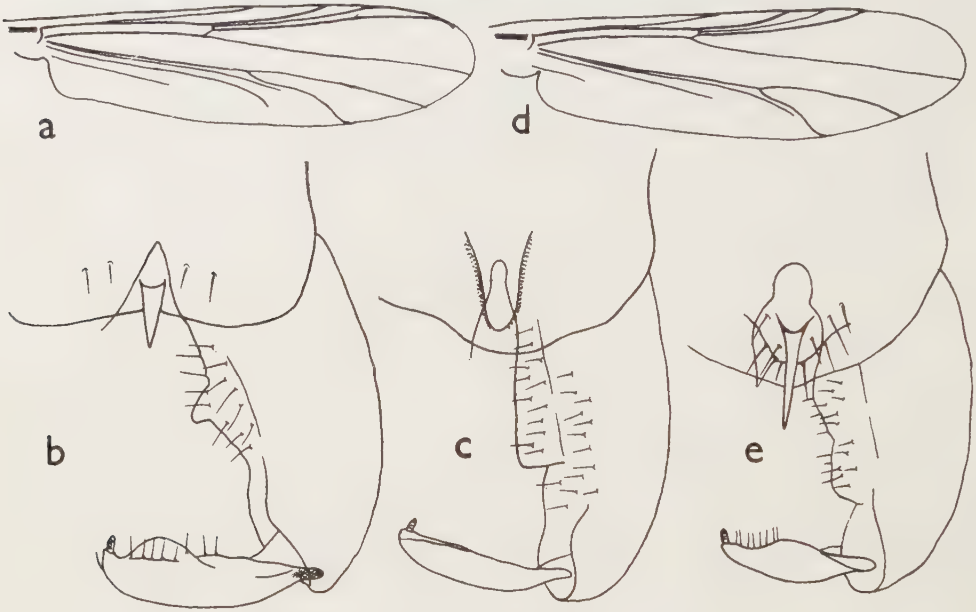

Fig. 15.—Wings and hypopygia of males of *Smittia*: *a* and *b*, *S. aterrima; c*, *S. wirthi; d* and *e*, *S. retracta.*

Female.—Similar to male.

Types.—I have seen 1 ♂ and 1 ♀ cotypes of *macleayi* from Sydney which are in the Macleay Museum and have selected the ♂ as lectotype.

Additional specimens seen.—QUEENSLAND: Burpengary, T. L. Bancroft, 1 ♂. NEW SOUTH WALES: Warriewood, Narrabeen, and Hornsby, W. W. Wirth, 7 ♂♂, 1 ♀. AUSTRALIAN CAPITAL TERRITORY: Canberra, Aug. 1930, L. M. Willings, 4 ♂♂, 1 ♀ (CSIRO). VICTORIA: Cheltenham, F. E. Wilson, 2 ♂♂, Melbourne, 2 ♂♂. TASMANIA: 1 ♂, A Whyte (SPHTM). WESTERN AUSTRALIA: Katanning, Aug. 1937, K. R. Norris, 1 ♂ (CSIRO). The species is also known from the Palaearctic Region and from Africa south of the Sahara.

SMITTIA WIRTHI, sp. nov.

Black species, costa produced, anal lobe absent, A.R. less than 1, eyes bare, hypopygium with bare anal point which is broad and ridge-like. Easily separated from *aterrima* by the male hypopygium, bare eyes, and absence of anal lobe to the wing.

Wing length.—1·4 mm.

Male.—*Head*, mouthparts, and antennae black, eyes bare; antennae with ratio only about 0·8, apical segment with plume hairs absent from apical third where there are short hairs only. *Thorax* black, slightly pruinose, acrostichals probably absent, dorsocentrals uniserial. *Legs* brown, posterior tibial hairs short, not longer then one and a half times diameter of tibia, L.R. about 0·5, pulvilli absent. *Wings* with venation similar to *aterrima* (Fig. 15, *a*) but anal lobe absent and anal vein not produced beyond posterior fork; halteres brown. *Abdomen* black, hypopygium (Fig. 15, *c*) with broad ridge-like anal point, not projecting beyond margin of 9th tergite; coxite lobe smooth in outline, styles lacking inner flange.

Type.—Holotype ♂ from Careel Bay, N.S.W., salt marsh, Oct. 1956, W. W. Wirth, returned to USNM.

SMITTIA RETRACTA, sp. nov.

Black species, eyes bare, tibial hairs long, costa in male short and not produced, posterior fork short and relatively wide, anal point long and narrow. Although showing some resemblance to *Camptocladius*, the absence of pulvilli and the presence of the apical antennal bristle place it here.

Wing length.—1·2–1·3 mm.

Male.—*Head*, mouthparts, and antennae blackish, eyes bare, antennae with short hairs at apex and a stouter apical bristle, A.R. about 0·8. *Thorax* black and slightly pruinose, acrostichals absent. *Legs* brown, L.R. about 0·5, pulvilli absent, posterior tibiae with long hairs, about four times as long as tibial diameter. *Wings* (Fig. 15, *d*) with characteristic venation, costa retracted, posterior fork short and relatively wide, *An* short, anal lobe rounded but not produced; halteres black. *Abdomen* black, hypopygium (Fig. 15, *e*) with long, narrow, bare anal point arising from a hairy pad on tergite, coxite lobe not conspicuous, styles tending to be narrow, but not always as constricted near apex as shown in figure.

Female.—Not known.

Types.—Holotype ♂ and 2 ♂ paratypes from Narrabeen, N.S.W., Oct.–Nov. 1956, W. W. Wirth. Further paratypes: NEW SOUTH WALES: Mosman, March 1957, W. W. Wirth, 1 ♂; Hornsby, Feb. 1957, D. J. Lee, 1 ♂. Holotype returned to USNM, two paratypes retained in BM.

Genus CAMPTOCLADIUS van der Wulp

Camptocladius van der Wulp, 1874, p. 133. Brundin, 1956, p. 160.

Spaniotoma, subgenus *Smittia* Group C Edwards, 1929, p. 362.

Type species *Tipula stercoraria* De Geer.

Eyes bare, antennae lacking strong apical bristle, pronotum of normal size, acrostichal bristles absent; in lateral view, postnotum appearing pointed posteriorly; wings bare, squama bare, costa ending basal to level of apex of M_{3+4}, not produced, Cu_1 strongly bent, *An* long, curved, and reaching wing margin; pulvilli present; anal point stout, long, and bare.

This genus contains a single distinctive species with a Palaearctic distribution. Specimens from New South Wales and also from New Zealand seem to be inseparable from European ones of the type species.

CAMPTOCLADIUS STERCORARIUS (De Geer)

Tipula stercoraria De Geer, 1776, p. 388.

Spaniotoma (Smittia) stercoraria Edwards, 1929, p. 362.

Camptocladius stercorarius Brundin, 1956, p. 161.

Black species, antennal plumes mostly white, wings milky, costa not produced, anal point stout and bare. Australian and New Zealand specimens are indistinguishable from Palaearctic ones and I can see no reason for regarding them as belonging to a separate species.

Wing length.—1·5 mm.

Male.—Whole body and legs blackish, antennal plumes white except at base where there are some black hairs, wings milky. Antennal ratio about 1·0, apex of antenna with short hairs; wing venation (Fig. 16, *a*) very characteristic; hypopygium (Fig. 16, *e*) also characteristic, anal point long, stout, and bare, style narrow at apex.

Female.—Resembles male.

Specimens seen.—NEW SOUTH WALES: Hornsby, Mosman, Narrabeen, Newport, W. W. Wirth and D. J. Lee, 6 ♂♂; Girralong, Jan. 1953, S. W. Bailey, 1 ♂, 1 ♀ (CSIRO) — emerged from soil; Gordon, March 1936, D. F. Waterhouse, 1 ♂ (CSIRO). I should also like to record that I have seen 1 ♂ and 4 ♀♀ from Paiaka, N.Z., R. A. Cumber (BM).

Genus PSEUDOSMITTIA Goetghebuer

Pseudosmittia Goetghebuer, 1932, p. 126 (as subgenus of *Smittia*); Brundin, 1956, p. 165.

Type species *Spaniotoma (Smittia) angusta* Edwards, 1929.

Eyes bare or finely pubescent, dorsal narrow portion absent, A.R. variable, sometimes very low, antenna without stout bristle at apex. Pronotum normal or reduced, acrostichal bristles absent. Costa not or scarcely produced, R_{2+3} variable, posterior fork well distal to crossvein, macrotrichia absent from membrane, squama bare. Anal point short or absent.

The three species that are being placed here do not conform with *Smittia* on antennal, venational, and hypopygial characters but it seems possible to treat them as members of this genus, at any rate for the present.

KEY TO AUSTRALIAN SPECIES OF THE GENUS PSEUDOSMITTIA

1. R_{4+5} fused with costa .... *imperfecta* (Skuse)
These veins not fused 2
2. Eyes bare, A.R. 0·4, apical segment of antenna of male with plume hairs on basal half .... *crassipennis* (Skuse)
Eyes pubescent, A.R. 0·2, apical segment of male antenna lacking plume hairs .... *latifurca,* sp. nov.

PSEUDOSMITTIA IMPERFECTA (Skuse)

Ceratopogon imperfectus Skuse, 1889, p. 307.

Spaniotoma (Smittia) imperfectus Lee, 1948, p. 330.

The female holotype is the only specimen known; it is rather damaged and has been mounted on a slide. It is extremely similar to both *Smittia conjuncta* Edwards from the Palaearctic Region and *S. paraconjuncta* Hardy from Hawaii.

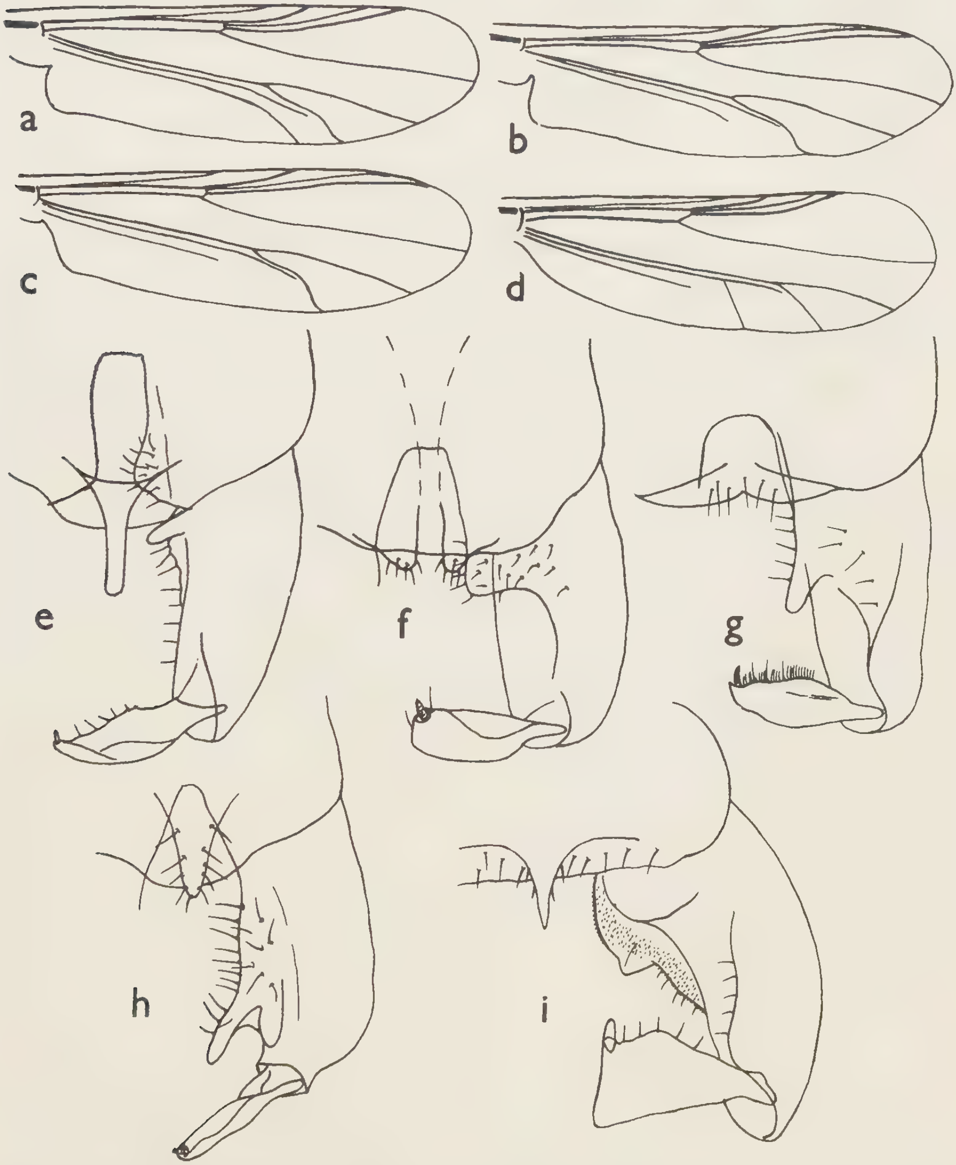

Fig. 16.—Wings and hypopygia of males of Orthocladiinae: *a, Camptocladius stercorarius; b, Pseudosmittia crassipennis; c, P. latifurca; d, Orthosmittia reyei; e, Camptocladius stercorarius; f, Pseudosmittia crassipennis; g, P. latifurca; h, Orthosmittia reyei; i, Doloplastus monticola.*

All three are known only from females and show fusion of R_{4+5} with the costa, which no doubt caused Skuse to regard his species as belonging to

Ceratopogon; the absence of anal lobe and the shortness of the posterior fork are other superficial similarities (see figure in Skuse 1889). In the modern classification given by Brundin (1956), they all fall into *Pseudosmittia*, but should quite likely be placed eventually in a separate genus. When more specimens of both sexes of all three species are found, it will be possible to provide fuller descriptions and a more positive statement on their correct genus.

Type.—Holotype ♀ from Sydney in the Macleay Museum.

PSEUDOSMITTIA CRASSIPENNIS (Skuse), comb. nov.

Camptocladius crassipennis Skuse, 1889, p. 264. Kieffer, 1906, p. 24; 1917, p. 228.

Black species, antennal ratio only about 0·4, eyes bare; pulvilli absent or very small; costa not produced, anal lobe rather prominent, anal point absent but tergite with 2 hairy lobes at apex, style broad. This is probably a marine species.

Wing length.—1·4–1·6 mm.

Male.—*Head*, antennae, and mouthparts black, eyes bare, antennae with segments 2–13 rather more discrete than in many species of the family, A.R. about 0·4, last segment with short hairs on its apical half and plume hairs on its basal half. *Thorax* black, slightly pruinose. *Legs* brown, hairs on posterior tibia only about one and a half times as long as width of tibia, what appear to be small pulvilli can just be distinguished, L.R. about 0·6. *Wings* with venation as in Figure 16, *b*, costa not produced, R_{2+3} long, *An* ending about opposite fork, anal lobe present; halteres dark brown. *Abdomen* black; hypopygium (Fig. 16, *f*) with 2 dark areas underlying 9th tergite and ending at apex in 2 hairy lobes, anal point quite absent, styles broad and flattened on inner surface.

Female.—Differs from male in having thoracic stripes separate and shoulders yellowish; anal angle of wing prominent.

Types.—I have seen the cotype series of 3 ♀♀ from Port Jackson, N.S.W., which is in the Macleay Museum and I have selected one as lectotype.

Additional specimens seen.—NEW SOUTH WALES: Careel Bay, Sept.–Dec. 1956 and 1957, D. J. Lee and W. W. Wirth, numerous specimens of both sexes; Berowra Waters, intertidal rocks, Sept. 1956, D. J. Lee and W. W. Wirth, numerous specimens. Skuse remarks that it is possibly a marine species and this seems to be borne out by later collections.

PSEUDOSMITTIA LATIFURCA, sp. nov.

In general colour and appearance very similar to *P. crassipennis*, but separable as follows: antennal ratio low, the apical segment being hardly longer than the two preceding together, giving an A.R. of about 0·2, apical segment lacking plume hairs altogether; eyes finely pubescent; wings (Fig. 16, *c*) with venation extremely similar to *crassipennis*, posterior fork perhaps wider, anal lobe rather angular; halteres pale; male hypopygium (Fig. 16, *g*) lacking anal point, but 9th tergite with a few hairs, coxite lobe prominent.

Types.—Holotype ♂ from Narrabeen, N.S.W., Dec. 1956, W. W. Wirth returned to USNM. Paratype from Careel Bay, N.S.W., Nov. 1957, D. J. Lee, 1 ♂ (SPHTM).

Genus ORTHOSMITTIA Goetghebuer

Orthosmittia Goetghebuer, 1943, p. 110.

Spaniotoma, subgenus *Smittia,* group E in part, Edwards, 1929, p. 363.

Type species *Orthocladius* (*Dactylocladius*) *brevifurcatus* Edwards, 1926.

Other species placed here include *bifurcata* Tokunaga (Japan), *macrobrachius* Edwards (Samoa), *melanostola* Kieffer (Seychelles), *hirtella* Freeman (Africa south of the Sahara).

This genus is being adopted for convenience to include small species with bare squama and short posterior fork, *Cu* being straight (Fig. 16, *d*). In addition the species usually possess a false vein forming a spurious fork basal to the posterior fork and the anal lobe is absent. Whether the group is a natural one is not at all certain (see Brundin 1956, p. 168) and this uncertainty is accentuated by the diversity of hypopygial structure. The wing venation is similar for all the species and it is usual for the costa to be strongly retracted.

ORTHOSMITTIA REYEI, sp. nov.

A minute dark species, A.R. about 1, venation with strongly retracted costa and short fork, male hypopygium with stout hairy anal point and 2-branched coxite lobe. Separable from other species of the genus by the male hypopygial structure, especially the anal point.

Wing length.—0·8 mm.

Male.—*Head* and antennae blackish, palpi paler, eyes bare, A.R. about 1·0, apex of antenna slightly clubbed and with short hairs only. *Thorax* completely dark, slightly shining, acrostichal bristles absent. *Legs* pale brown, pulvilli absent, L.R. 0·5. *Wings* (Fig. 16, *d*) with strongly retracted costa which is scarcely produced, posterior fork short, false accessory fork present; halteres pale. *Abdomen* dark, hypopygium (Fig. 16, *h*) with stout and hairy anal point, coxite lobe 2-branched, the inner branch overlying the coxite, style rather narrow.

Type.—Holotype ♂ from Woody I., Qld., 10.ix.1953, E. J. Reye, returned to SPHTM.

Genus DOLOPLASTUS Skuse

Doloplastus Skuse, 1889, p. 260. Kieffer, 1906, p. 28; 1917, p. 228.

Type and only known species *Doloplastus monticola* Skuse, 1889.

Eyes bare, antennae of male with only 8 segments and no plumes, of female with 6 segments, palpi 4-segmented. Acrostichal hairs absent, prothorax only slightly reduced centrally, postnotum with central furrow. Posterior tibial combs present, outer spur about half length of inner, pulvilli absent, all tarsal segments cylindrical. Squama bare, anal lobe of wing absent; *Cu* straight, R_{2+3} ending midway between R_1 and R_{4+5}, costa slightly produced, posterior fork rather beyond *r-m*, microtrichia not visible, macrotrichia absent. Male hypopygium large, anal point present.

This genus would previously have been placed as a synonym of *Smittia* Holmgren but I prefer to treat it as separate until more final decisions are reached both on the status of that genus and of others in the subfamily. *Doloplastus* is easily recognized in the male by the antennae and the large genitalia, but the female resembles other females of the subfamily so far as can be seen from the single damaged specimen. The condition of the spermatheca is unknown.

DOLOPLASTUS MONTICOLA Skuse

Doloplastus monticola Skuse, 1889, p. 260. Kieffer, 1906, p. 29; 1917, p. 228.

A dark brown or blackish species with brown legs and large hypopygium, wing length 1·0 mm.

The type material which is all that is known, is gummed down on to card and is difficult to examine satisfactorily. The species will, however, readily be identified from the structure of the male hypopygium (Fig. 16, *i*) and the 8-segmented male antennae which lack plumes. The intermediate antennal segments are oval and the apical one equals to the preceding two together. The wing, figured by Skuse, lacks anal lobe and the squama is bare. The anal vein ends opposite the posterior fork which is distal to the crossvein, *Cu* is more or less straight, and the costa slightly produced. The female antenna is 6-segmented and perfectly normal.

Types.—Cotype series of 15 ♂♂ and 1 ♀ from Mt. Kosciusko in the Macleay Museum. The material is in too poor condition to select a lectotype; no other specimens are known.

Genus THIENEMANNIELLA Kieffer

Thienemanniella Kieffer, 1911, p. 187. Freeman, 1956, p. 364. Brundin, 1956, p. 171.

Type species *Corynoneura clavicornis* Kieffer, 1925.

Eyes pubescent, male antenna with 11–13 segments. Veins R_1 and R_{4+5} entirely fused with one another and almost entirely fused with the thickened costa to form a "clavus", which extends about two-fifths length of wing in male and beyond middle in female; a false vein runs from *r-m* below the clavus and then close to the wing margin almost as far as the wing tip; wing membrane without macrotrichia or microtrichia, squama bare. Fourth tarsal segment shorter than the 5th and often more or less heart-shaped; posterior tibiae without apical projection and not swollen. Internal struts of the male hypopygium larger than usual, though not as large as in *Corynoneura*, the transverse pair forming a pair of curved "parameres"; very small species, wing length less than 1·5 mm.

Only one species is known to the author from Australia and this seems to be inseparable from an African species.

THIENEMANNIELLA TRIVITTATA Goetghebuer

Thienemanniella trivittata Goetghebuer, 1935, p. 377. Freeman, 1956, p. 365.
Thienemanniella analis Freeman, 1953, p. 212.

The six specimens placed here seem virtually indistinguishable from African specimens of *trivittata*, the antennae, wings, and male hypopygium being exactly similar; figures of these parts are given in Freeman's (1956) account of the species, to which reference should also be made for a more detailed description.

Wing length.—1–1·2 mm.

Male blackish, female more yellow and with separate stripes; last segment of male antenna as long as preceding 3 together, slightly clubbed, basal half with plume hairs, apex with short hairs, flagellum with 12 segments; anal area of wings well developed in both sexes and first abdominal segment, again in both sexes, with a group of 4–6 bristles each side.

Australian specimens seen.—Dee Why, N.S.W., Sept. 1956, W. W. Wirth, 2 ♂♂, 4 ♀♀. Canberra, Nov. 1929, A. L. Tonnoir, 1 ♀.

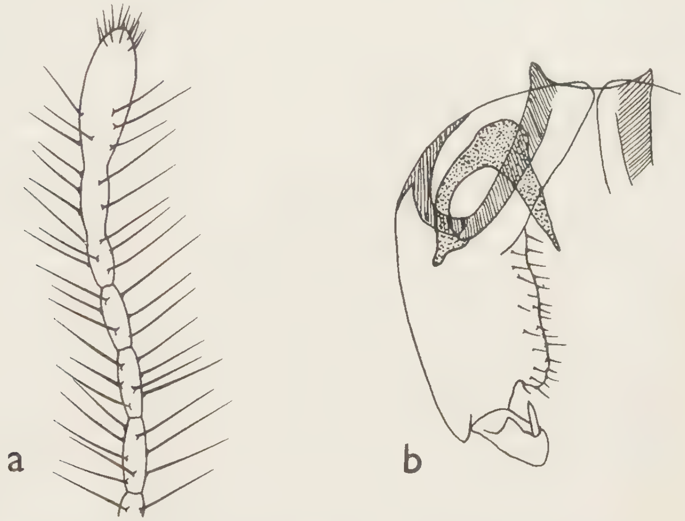

Fig. 17.—*Corynoneura australiensis*: *a*, apex of male antenna (only bases of plume hairs shown); *b*, male hypopygium.

Genus CORYNONEURA Winnertz

Corynoneura Winnertz, 1846, p. 12. Freeman, 1956, p. 361. Brundin, 1956, p. 172.

Type species *Corynoneura scutellata* Winnertz, 1846.

Very similar to *Thienemanniella* but to be distinguished as follows: eyes bare, male flagellum 10-segmented; posterior tibia somewhat swollen at tip, obliquely truncate and with a conspicuous apical projection on inner side; costa shorter, extending less than two-fifths of wing in male and to about the middle in the female; internal struts of male hypopygium better developed.

There are two species of this genus in the material at the author's disposal — one, described below, being present in both sexes. The second species is represented by a single female from New South Wales National Park, Aug. 1953, E. J. Reye, and is very like the African species *C. dewulfi* Goetghebuer, having a rosette at the apex of the antenna. It is necessary to see material of both sexes before describing it.

CORYNONEURA AUSTRALIENSIS, sp. nov.

A minute blackish insect with typical characters of the genus. Male antenna with 10 segments, flagellum differing from other species by the last segment being clubbed and elongate and with traces of a division into 3 segments; squama bare, hypopygium not unlike *C. cristata* Freeman from Africa. Female with separate scutal stripes, costa longer than in male, as usual.

Wing length.—1·0 mm.

Male.—*Head* blackish, mouthparts and antennae paler, eyes bare; flagellum with 10 segments, the apical one clubbed, with short hair at extremity (Fig. 17, *a*) and showing incipient division into 3 segments; basal two-thirds of apical segment bearing plume hairs. *Thorax* blackish, stripes fused. *Legs* brown, L.R. about 0·5. *Wings* very similar to other species of the genus, clavus short, reaching hardly more than one-quarter of wing length; halteres pale. *Abdomen* whitish on basal 4 segments, hypopygium (Fig. 17, *b*) not unlike *cristata* but "parameres" rather different in shape.

Female.—Paler than male on thorax where ground colour yellowish and stripes separate; wings broader and clavus reaching almost to middle of wing.

Types.—Holotype ♂ and paratype ♀, Blundell's, A.C.T., Sept. 1930, L. F. Graham, returned to CSIRO.

Subfamily **CHIRONOMINAE**

Eyes with dorsal narrow portion developed (except in *Pseudochironomus* and one or two other aberrant or primitive non-Australian genera); male antennae plumose and with 11–14 segments, female antennae with 5–7 segments. Pronotum sometimes collar-like, but often reduced and not visible from above, postnotal furrow distinct. Anterior tibia in most genera terminating on the inner side in a "scale" which may be low and rounded or oval and more produced or it may carry a bristle-like spur; in a few genera anterior tibia with a strong spur with enlarged base not unlike those of other tibiae; middle and posterior tibiae with two apical combs composed of basally fused spinules, the tibial spurs are associated with these combs, but one or both spurs may be reduced or absent, combs may be fused or separate. Anterior basitarsus nearly always longer than tibia (L.R. more than 1). True base of M_{3+4} never present, R_{2+3} present but never connected to R_1 by a crossvein; costa almost always ending abruptly at tip of R_{4+5}. Male hypopygium not inverted, styles almost invariably directed rigidly backwards and without terminal spine, coxites usually with two or more basal appendages (reduced in *Chironomus*, subgenus *Cryptochironomus*, and occasionally elsewhere).

This is the largest subfamily of Chironomidae in Australia, the species being especially typical of warm water environments. The classification employed is very similar to the one used for the African fauna (Freeman 1956).

Key to Australian Genera of the Chironominae

1. Wings fully developed, membrane without macrotrichia, or if present then squama with fringe of long hairs; crossvein *r-m* definitely oblique to direction of R_{4+5} (tribe Chironomini) 2
   Either wing membrane with macrotrichia at least towards the apex or else wings reduced or absent (marine species); squama without fringe; crossvein nearly parallel to and practically continuous with R_{4+5} (tribe Tanytarsini) 15

2. Posterior tibia with 2 spurs, i.e. each comb with a spur 3
Posterior tibia with a single spur which is on the small outer comb, the large inner one being unarmed 9

3. Anterior tibia with well-formed black spur, the base being enlarged (as in the Holarctic genus *Pseudochironomus*) 4
Anterior tibia at most with an oval transparent "scale", carrying a small point or spine in some species 5

4. Prothorax broad and collar-like; costa retracted and slightly produced; anal point present in male .... *Megacentron*, gen. nov.
Prothorax narrow and applied to mesonotum; costa neither retracted nor produced; anal point absent .... *Riethia* Kieffer

5. Pronotum reaching up to front of mesothorax, sometimes collar-like, sometimes closely applied to mesonotum 6
Pronotum much reduced and far surpassed by mesonotum which projects as a cone over the head 8

6. Middle and posterior tibiae with combs at different levels (Fig. 22, *c*), on middle tibia the inner one unarmed .... *Imparipecten*, gen. nov.
Combs more or less at same level; on middle tibia both are armed 7

7. Acrostichal bristles absent; combs strongly conical .... *Conochironomus*, gen. nov.
Acrostichal bristles present; combs not strongly conical .... *Chironomus* Meigen

8. Wing membrane clothed with macrotrichia .... *Harrisius* Freeman
Wing membrane bare of macrotrichia .... *Stenochironomus* Kieffer

9. Anterior tibia with strong black spur 10
Anterior tibia either unarmed or with a short point or spine at apex of a triangular or oval "scale" 11

10. Squama bare .... *Lauterborniella* Bause
Squama with complete fringe .... *Parvitergum*, gen. nov.

11. Prothorax reduced and head overhung by mesonotum; acrostichal bristles reduced to a group at apex of mesonotal cone .... *Microtendipes* Kieffer
Prothorax more or less reaching up to front of mesothorax, head not overhung by mesonotum; acrostichal bristles present as a complete double row or absent, not reduced to an anterior group 12

12. Acrostichal bristles absent .... *Skusella*, gen. nov.
Acrostichal bristles in 2 well-formed rows 13

13. Combs of posterior tibiae fused; pulvilli usually present, although sometimes small .... *Stictochironomus* Kieffer
Combs separate; pulvilli present or absent 14

14. Pulvilli quite absent; hypopygium with appendage 2*a* present .... *Paraborniella*, gen. nov.
Pulvilli well developed, under high power seen to be split longitudinally, making 4 narrow lobes; hypopygium lacking appendage 2*a* in Australian species .... *Polypedilum* Kieffer

15. Marine species, wings reduced in male and absent in female; tibial combs and spurs absent; female vermiform .... *Pontomyia* Edwards
Not like this; wings and usually combs and spurs fully developed in both sexes; female not vermiform 16

16. Tibial combs fused ventrally .... *Lundstroemia* Kieffer
Tibial combs clearly separated 17

17. Scutellum with only 2 marginal hairs; wings cuneiform; R_{4+5} ending basal to level of apex of M_{3+4} .... *Stempellina* Bause
Scutellum with several long marginal hairs; wings not, or seldom, cuneiform, R_{4+5} ending above or beyond apex of M_{3+4} .... *Tanytarsus* van der Wulp

Genus MEGACENTRON, gen. nov.

Pseudochironomus Edwards, 1931, p. 307 (in part).

Type species *Chironomus erebeus* Skuse, 1889.

Male antenna with 14 segments, female with 7; dorsal narrow portion of eyes well formed in both sexes; frontal tubercles absent, palpi well developed. Prothorax broad, reaching up to front of mesonotum, easily visible from above and with only a shallow central emargination; dorsocentral bristles fine and uniserial, acrostichals present but difficult to see. Anterior tibia with strong spur arising from a small comb as in *Pseudochironomus* and *Riethia;* middle and posterior tibiae with separate triangular or conical combs, each carrying a long strong spur; L.R. less than 1, pulvilli absent. R_{2+3} reaching costa midway between R_1 and R_{4+5}; costa slightly produced, retracted so that its apex is basal to apex of M_{1+2}; squama fringed. Eighth abdominal tergite of male not constricted, anal point well developed, coxite with median constriction, appendage 2*a* present but intercoxite appendages seen in *Pseudochironomus* absent.

In some respects, such as the formation of the spurs on the anterior tibiae, the short basitarsus and the large pronotum, this genus resembles *Pseudochironomus,* but the well-formed dorsal narrow portion to the eyes and the quite different male hypopygium make a separate genus more satisfactory. It can be distinguished from *Riethia* by the broad collar-like prothorax, by the retracted and slightly produced costa, and by the absence of anal point. *P. cuneicalcar* Edwards from Argentina also falls into this genus but differs slightly from *erebeus* in the more conical shape of the combs which have the spurs in the form of apical extensions.

MEGACENTRON EREBEUS (Skuse), comb. nov.

Chironomus erebeus Skuse, 1889, p. 243.

Blackish species, tarsi paler, wings brown along costal margin; easily recognized by generic characters and by the constricted appearance of tibial combs and spurs.

Wing length.—3·5 mm.

Male.—Head, mouthparts, and antennae dark brown, A.R. 2·5. *Thorax* shining blackish, overlaid with some pruinose "bloom", pleural membrane pale. *Legs* black, tarsi rather paler, L.R. 0·9, combs of middle and posterior legs in form of broad triangles each with a long spur at apex; spur appears swollen in basal half, due to some comb teeth becoming attached to spur rather than comb, perhaps caused by constriction at apex of comb and is quite characteristic. *Wings* brownish along costal margin, halteres yellow. *Abdomen* shining black; hypopygium (Fig. 18, *a*) with strong anal point and 3 pairs of coxite appendages; hairs on appendage 2 bifid at apices.

Female.—Resembles male.

Types.—I have seen the two cotype ♀♀ from Woronora, N.S.W., which are in the Macleay Museum and I have selected the better specimen as lectotype.

Additional material seen.—NEW SOUTH WALES: Glenreagh, Feb. 1923, 1 ♀ (SPHTM); Coramba, Feb. 1925, 1 ♂ (BM); Dorrigo, Oct. 1927, W. Heron, 1 ♂ (USNM). VICTORIA: Buninyong (?), 1 ♂ (NM).

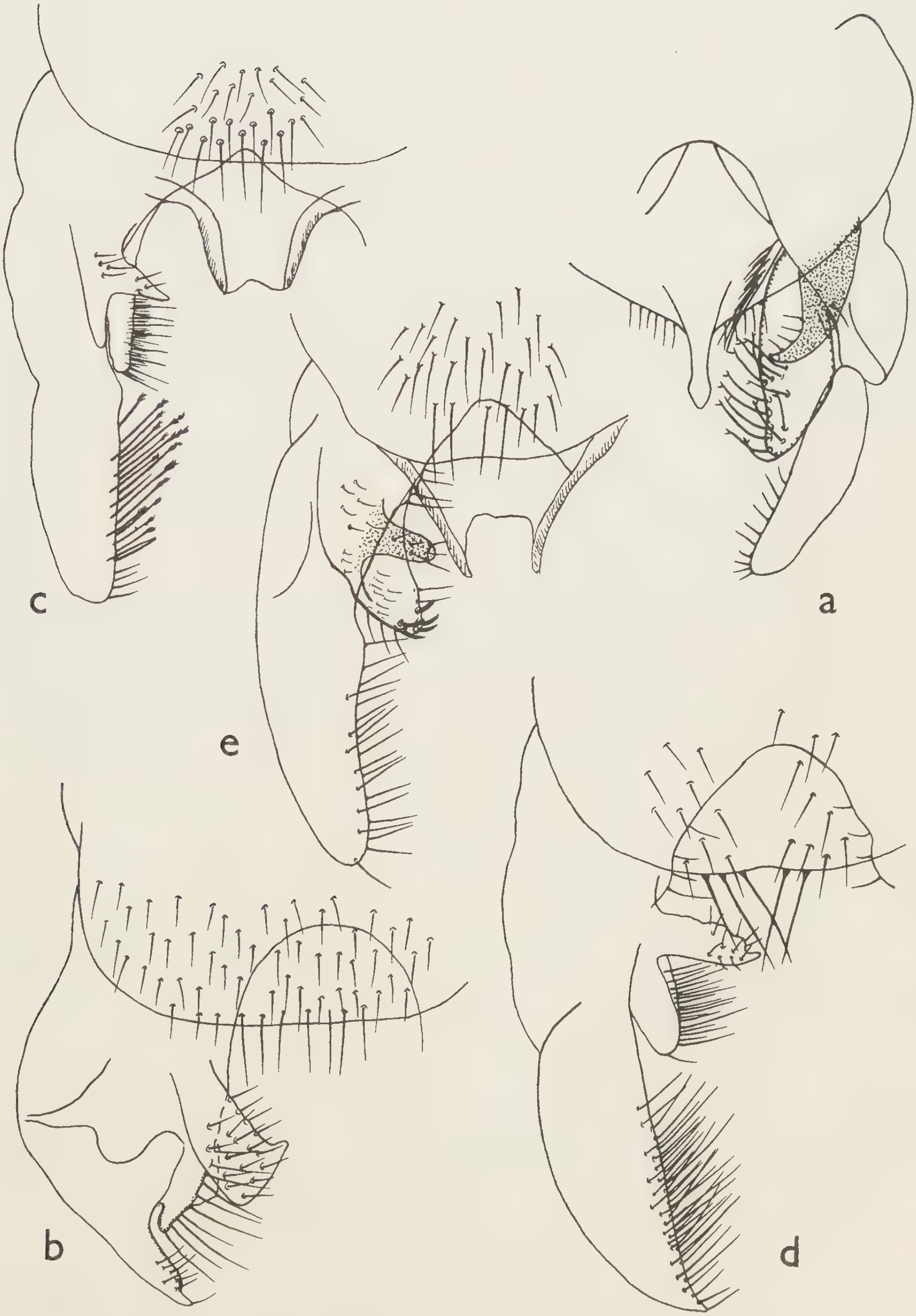

Fig. 18.—Male hypopygia of: *a, Megacentron erebeus; b, Riethia stictoptera; c, R. plumosa; d, R. cinctipes; e, R. zeylandica.*

Genus RIETHIA Kieffer

Riethia Kieffer, 1917, p. 203. Freeman, 1959, p. 421.

Type species *Riethia stictoptera* Kieffer, 1917.

Male antenna with 14 segments, female with 6 or 7, eyes with well-formed dorsal narrow portions. Prothorax applied to front of mesothorax, not collar-like. Anterior tibia with well-formed black spur, the base being enlarged as in *Pseudochironomus,* other tibiae with a pair of subtriangular combs each carrying a long spur at the apex, pulvilli present or absent. Costa neither produced nor retracted, squama with complete fringe. Hypopygium lacking anal point, 2 coxite appendages present.

When I redefined this genus in 1959, I restricted it to species known from Australia, New Zealand, and South Chile on a basis of spur formation, eye structure, and size of prothorax. Further details are given in my 1959 paper on the New Zealand species.

Key to Australian Species of the Genus Riethia

1. Legs with well-developed dark markings at least at anterior knees; abdomen more or less banded, often conspicuously so 2
   Legs and abdomen quite unmarked 3
2. Anterior femur dark at apex only, styles conical (Fig. 18, *b*) ....*stictoptera* Kieffer
   Anterior femur with dark subapical ring in addition to apical darkening; styles elongate oval ....*cinctipes,* sp. nov.
3. Wing length 2·3–2·6 mm; appendage 2 of male hypopygium with 5–6 pectinate spines, style hairs simple (Fig. 18, *e*) ....*zeylandica* Freeman
   Wing length 3–4 mm; appendage 2 with simple hairs, style with branched hairs (Fig. 18, *c*) ....*plumosa,* sp. nov.

Riethia stictoptera Kieffer

Riethia stictoptera Kieffer, 1917, p. 203.

Riethia asticta Kieffer, 1917, p. 205 (syn. nov.).

Medium-sized species, thorax with reddish markings tinged with dark brown; anterior knees, apices of tibiae and of tarsal segments blackish; wings usually, though not always darkened at crossveins and base of posterior fork; abdomen banded, styles contracted and pointed.

The wing markings are variable and specimens occur in which the wing markings are reduced or absent; these are identical in both sexes in structure and in other colour pattern details. Kieffer described *asticta* from such a female, although in his specimen the crossvein itself was darkened; he also mentioned that the anterior tibial spur was shorter, but this is usually so in the female.

Wing length.—3·25–3·5 mm.

Male.—*Head,* mouthparts, and antennae yellowish brown, A. R. 2·5. *Thorax* yellow with stripes, postnotum and sternopleuron reddish tinged with dark brown, especially along outer margin of stripes. *Legs* yellowish, anterior knees and apices of all tibiae and of tarsal segments blackish, pulvilli present but not large, L.R.

about 1·0. *Wings* usually with small dark clouds over crossvein and base of posterior fork though these may be reduced; halteres yellow. *Abdomen* yellow, each segment with broad dark band at apex; hypopygium (Fig. 18, *b*) quite characteristic, 9th tergite with numerous hairs, coxite and style short and more or less fused, style conical, finger-like at apex, appendage 1 hooked, appendage 2 reduced but with long hairs, anal tube not sclerotized.

Female.—Similar to male, antennae 7-segmented.

Types.—The type specimens of both species (*stictoptera* from Sydney and *asticta* from Springwood, N.S.W.) were in the Hungarian National Museum and are probably lost.

Specimens seen.—PAPUA: Kokoda, Aug. 1933, L. E. Cheesman, 1 ♂ (BM). NEW SOUTH WALES: Belmore Falls, Oct. 1938, A. L. Tonnoir, 1 ♂; National Park, Sept. 1922, A. L. Tonnoir, 1 ♂; Narooma, Nov. 1930, A. L. Tonnoir, 2 ♀♀; Hornsby, Jan. 1958, D. J. Lee, 2 ♂♂, 1 ♀; Yass, K. English, 2 ♀♀. AUSTRALIAN CAPITAL TERRITORY: Black Mountain, various collectors, 7 ♂♂, 8 ♀♀ (CSIRO). VICTORIA: Melbourne, F. A. Singleton, 1 ♀; Coburg, Jan. 1919, M. Milligan, 1 ♂ (NM); Fern Tree Gully, Oct. 1928, F. E. Wilson, 1 ♂; Werribee Gorge, March 1929, F. E. Wilson, 1 ♂; Bendigo, Jan. 1930, F. E. Wilson, 2 ♂♂. TASMANIA: Mangalore, Sept. 1913, 1 ♂, and Brighton, Oct. 1913, 2 ♀♀, A. White (BM); Mt. Wellington, Nov. 1922, 1 ♀, A. L. Tonnoir; Geeveston, Dec. 1922, A. L. Tonnoir, 1 ♀; Strahan, A. L. Tonnoir, 1 ♂, 1 ♀. SOUTH AUSTRALIA: Aldgate, Oct. 1929, F. E. Wilson, 1 ♂, 1 ♀.

RIETHIA PLUMOSA, sp. nov.

Thorax greenish with reddish brown markings; legs, abdomen, and wings lacking distinct dark markings; styles carrying thick plumose bristles, anal tube fairly strongly sclerotized laterally.

Wing length.—3–4 mm.

Male.—*Head* greenish, mouthparts and antennae browner, A.R. about 2. *Thorax* greenish; stripes, postnotum, and sternopleuron reddish brown, tinged with brown. *Legs* greenish or yellowish brown, without any distinct darker markings, L.R. about 1·0, medium-sized pulvilli present. *Wings* differing from *stictoptera* by complete absence of darker spots or clouds. *Abdomen* unmarked, greenish; hypopygium (Fig. 18, *c*) with strongly formed anal tube, sclerotized laterally; 9th tergite with hairs centrally only; appendage 1 forked, appendage 2 not unlike *stictoptera*; styles more elongate and with numerous thick bristles along inner face, each plumose at tip.

Female.—Similar to male, antennae 7-segmented.

Types.—Holotype ♂ and 2 ♂ and 1 ♀ paratypes from Harz Mountains, Tas., Dec. 1922, A. L. Tonnoir. Further paratypes, all coll. A. L. Tonnoir: TASMANIA: Mt. Wellington, Nov. 1922, 2 ♂♂, Mt. Field, Dec. 1922, 2 ♂♂, 2 ♀♀; National Park, Dec. 1922, 1 ♂; Cradle Valley, Jan. 1923, 4 ♂♂, 5 ♀♀. Five paratypes retained in BM, holotype and remainder of series returned to SPHTM.

RIETHIA CINCTIPES, sp. nov.

Green species, thorax with reddish markings overlaid with black along outer margins, pleura with a black stripe; markings of legs and wings somewhat similar to *stictoptera*, but at least anterior femora, and usually others as well, with additional ring, abdomen less spotted, hypopygium distinctive.

Wing length.—2·2–3·5 mm.

Male.—*Head* green, A.R. nearly 2. *Thorax* green; stripes, postnotum, and sternopleuron reddish, each stripe and the postnotum with a black marking along lateral margin, pleuron with a narrow, black, horizontal stripe. *Legs* green, all knees, especially front ones, black, apices of all tibiae and of tarsal segments black; in holotype, anterior femora with a subapical black ring in addition, in paratype other femora with broad, more centrally placed, dark bands as well; tibial combs very bulky. *Wings* clouded over crossvein and at base of posterior fork, darkening extending some distance along veins; dark also at base and faintly at apex; halteres pale. *Abdomen* green, in holotype with a dark apical ring on segment 2 and with traces of similar rings on segments 3, 4, and 5; in paratype male with apical rings on segments 2–7, that on segment 2 being the broadest. Hypopygium (Fig. 18, *d*) not unlike *plumosa* in general appearance but details of coxite appendages different, style hairs simple, and anal tube not sclerotized laterally.

Female.—Antennae 7-segmented, thoracic pattern as in male; legs more conspicuously patterned, all femora with additional ring and tibiae with sub-basal band caused by immediate base being pale; wings with broader cross clouding, not so confined to forks as in male; abdomen with more definite dark apical bands on each segment.

Types.—Holotype ♂ from Hartley's Creek, near Cairns, Qld., Apr. 1957, W. W. Wirth, returned to USNM. Paratypes: NEW SOUTH WALES: Waterfall, Dec. 1921, A. L. Tonnoir, 1 ♀, retained in BM; Stanwell Park, March 1924, 1 ♀, returned to SPHTM. AUSTRALIAN CAPITAL TERRITORY: Blundell's, Feb. 1931, A. L. Tonnoir, 1 ♂ returned to CSIRO.

RIETHA ZEYLANDICA Freeman

Riethia zeylandica Freeman, 1959, p. 422.

Specimens from New South Wales and Tasmania appear to be indistinguishable structurally from New Zealand specimens. Some are rather darker, but this cannot be considered a specific difference. It is extremely similar to, but smaller than, *plumosa* and is best distinguished by the male hypopygium (Fig. 18, *e*).

Specimens seen.—NEW SOUTH WALES: Wentworth Falls, Oct. 1930, F. E. Wilson, 1 ♂; Narrabeen, Oct. 1956, W. W. Wirth, 1 ♂; Colo Vale, March 1957, W. W. Wirth, 1 ♂; Hornsby, Dec. 1958, D. J. Lee, 2 ♂♂. AUSTRALIAN CAPITAL TERRITORY: Lee Spring, Nov. 1938, A. L. Tonnoir, 3 ♂♂, 1 ♀. TASMANIA: Cradle Valley, Jan. 1923, A. L. Tonnoir, 3 ♂♂, 5 ♀♀.

Genus CHIRONOMUS Meigen

Chironomus Meigen, 1803, p. 260. Freeman, 1957, p. 329.

Type species *Tipula plumosa* Linnaeus, 1758.

Male antennae with 12 segments, female with 6; frontal tubercles frequently present. Prothorax reaching up to front of mesonotum where it may form a collar with or without central emargination. Anterior tibia without spur, combs of middle and posterior tibiae large and each with a short spur (spurs occasionally reduced or missing); pulvilli large and broad. Wing membrane without macrotrichia; squama with complete fringe; crossvein distinct and oblique, R_{2+3} ending only a little beyond tip of R_1.

The genus *Chironomus* as here defined includes the groups placed there by the present author in his account of the African species in 1957, to which reference should be made for further information and for fuller synonymy. It is probable that *Endochironomus* in its strictest usage should be considered as a separate genus on account of the 14-segmented male antennae. There are no species of the latter known at present from Australia although *Conochironomus* and *Imparipecten* would previously have been placed there.

The use of *Kiefferulus* for species in which appendage 2 of the male hypopygium is broad and racket-shaped and the mouthparts are fully developed follows Townes (1945). These species I would have previously placed in *Dicrotendipes*. I am not able satisfactorily to separate species with reduced hypopygial appendages into separate subgenera; all these I am placing again in *Cryptochironomus*.

There are four species described by Kieffer from Australian material in 1917 that I am not able to recognize at present. These are:

(1) *sydneyensis*, *microtomus*, and *humilis*, which were described from females from Sydney and are probably species of either *Dicrotendipes* or *Cryptochironomus*.

(2) *quadrifasciatus* described from a female from Queensland.

KEY TO AUSTRALIAN SUBGENERA OF THE GENUS CHIRONOMUS

1. Prothorax collar-like and with a well-marked V-shaped emargination; thorax often with lines of pruinosity; male hypopygium with both appendages 1 and 2 present .... *Chironomus*, s.s.
   Prothorax either narrow and applied to the front of of the mesothorax or broader but without V-shaped emargination; thorax usually lacking pruinose lines 2
2. Palpi shorter than usual; male tarsi bearded; thorax rounded in appearance and strongly dusted .... *Nilodorum* Kieffer
   Mouthparts fully developed; male tarsi usually not bearded; thorax not like this, often shining 3
3. Appendage 2 of male hypopygium long and narrow basally, so as to appear more or less clubbed or racket-shaped (Fig. 20); appendage 1 well formed 4
   Appendage 2 shorter, not racket-shaped, or absent; appendage 1 also reduced 5
4. Appendage 2 long and narrow, sometimes heart-shaped or forked at apex (Fig. 20) .... *Dicrotendipes* Kieffer
   Appendage 2 broad and racket-shaped (Fig. 19, *e–f*) ....*Kiefferulus* Goetghebuer
5. Appendage 2 well formed, reaching beyond end of coxite and with long curved hairs (Fig. 21, *a*) .... *Xenochironomus* Kieffer
   Appendage 2 reduced or absent, not reaching beyond end of coxite and without long curved hairs (Fig. 21, *b–g*) .... *Cryptochironomus* Kieffer

Genus CHIRONOMUS Meigen

Subgenus CHIRONOMUS, s.s.

Chironomus Meigen, 1803, p. 260. Freeman, 1957, p. 330.

Frontal tubercles present and elongate, palpi well formed; prothorax collar-like and with central V-shaped emargination; thorax often with pruinose lines; male hypopygium with both appendages 1 and 2 present and well formed; appendage 1 curved and bare, appendage 2 fairly broad and straight with long curved hairs at the apex; styles of most species contracted on about apical third and with a close-set row of short stiff bristles on inner side at tip. For a full synonymy reference should be made to Freeman (1957).

KEY* TO THE AUSTRALIAN SPECIES OF THE SUBGENUS CHIRONOMUS

1. Legs shorter than usual, posterior basitarsus at most only half length of tibia, whole tarsus less than one and a half times length of tibia; male hypopygium enlarged and with oval styles 2
   Posterior basitarsus about three-quarters length of tibia, whole tarsus one and two-thirds length of tibia; thorax often with some silvery pruinosity; male hypopygium of normal type 3
2. Thorax dull grey, pits of dorsocentral bristles very distinct; male hypopygium with appendage 2 much swollen (Fig. 19, *c*) . . . . *tepperi* Skuse
   Thorax greenish with brown stripes, pits normal; appendage 2 not swollen . . . . *magnivalva* Kieffer
3. Legs with definite colour pattern, tarsal segments dark at apices, tibiae either white or else knees definitely darkened 4
   Leg markings absent or else knees only vaguely darkened 5
4. Tibiae white; thorax reddish yellow, lacking pruinosity . . . . *vitellinus*, sp. nov.
   Tibiae not white, legs darkened above and below knees; thorax with striking pruinose pattern . . . . *nepeanensis* Skuse
5. Anterior tarsus of male with well-developed beard, L.R. only 1·2–1·3, wing length over 5 mm . . . . *australis* Macquart
   Beard absent, L.R. 1·5–1·7, wing length less than 5 mm . . . . *alternans* Walker

CHIRONOMUS (CHIRONOMUS) NEPEANENSIS Skuse

Chironomus nepeanensis Skuse, 1889, p. 231. Kieffer, 1906, p. 20; 1917, p. 206.

Yellowish brown species with darker markings on thoracic stripes; thorax with strong silvery pruinose lines and spots; legs marked with black at knees and at apices of tarsal segments; crossvein strongly darkened, abdominal segments dark sub-basally and along mid-line.

Wing length.—4–5 mm.

Male.—Head and mouthparts brown, antennae rather paler, frontal tubercles present, A.R. between 4 and 5. *Thorax* yellowish brown; stripes, postnotum, and sternopleuron brown or partially dark brown, especially along the margins; whole thorax slightly pruinose, with 2 diagonal silvery pruinose stripes on shoulders, 2 brilliant silvery spots anteriorly between lateral and median stripes, and 2 on lateral stripes; anterior to silvery spots, the stripes are more or less fused across. *Legs* yellowish brown, femora with apical or subapical dark ring, tibiae with sub-basal dark ring, more marked on front legs, all tarsal segments dark at apices; tarsal beard absent, L.R. about 1·5, posterior basitarsus three-quarters length of tibia. *Wings* with crossvein and base of *Rs* rather strongly darkened; halteres pale. *Abdomen* yellowish, each segment dark sub-basally and along mid-line; incisures pruinose. Hypopygium (Fig. 19, *a*) of a very normal type for the subgenus, styles and appendage 2 fairly narrow; anal point in lateral aspect broad at base and tapered to apex.

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* Based mainly on male characters, but applicable with care to females of some species.

Female.—Similar to male but darker markings and thoracic pruinosity more pronounced, apices of tibiae may also be darkened.

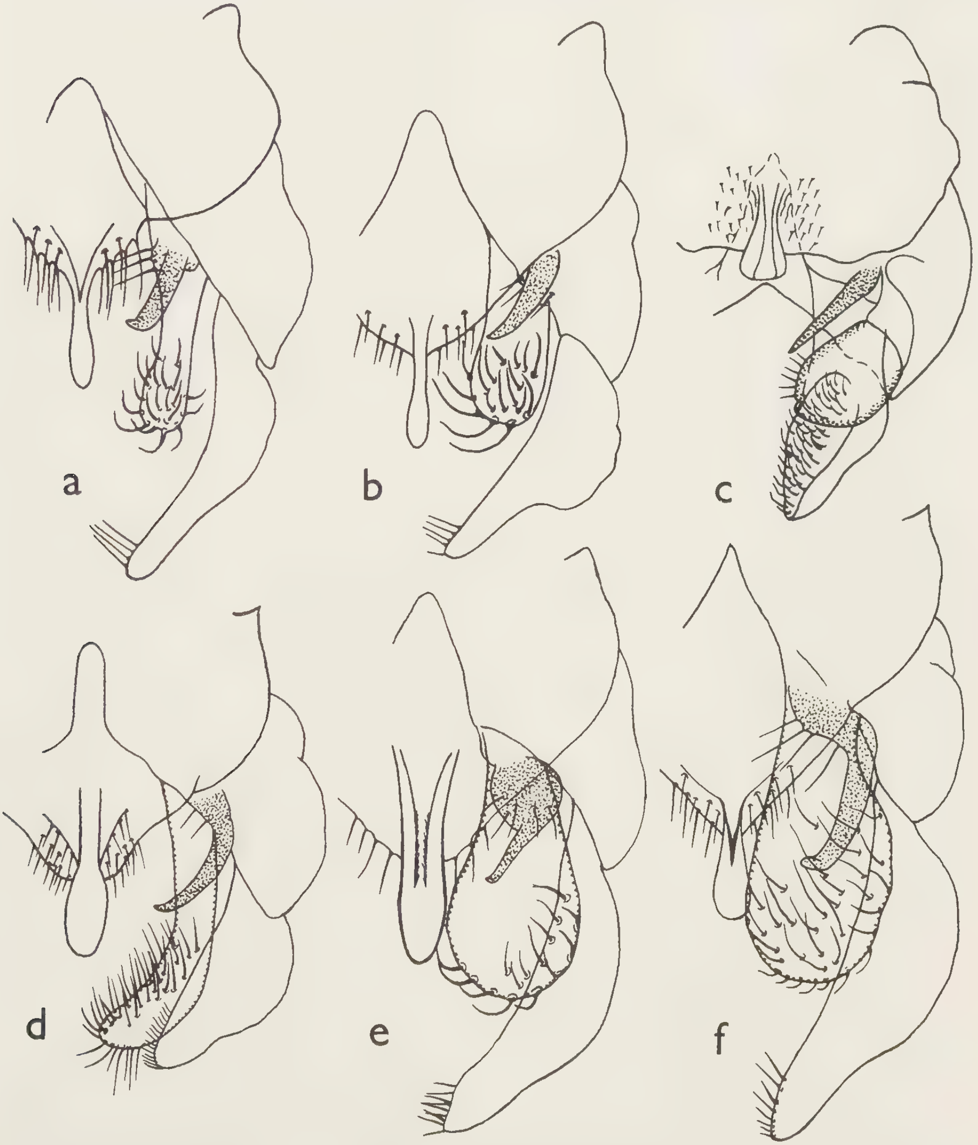

Fig. 19.—Male hypopygia of *Chironomus*: *a, Chironomus* (*Chironomus*) *nepeanensis; b, C.* (*C.*) *vitellinus; c, C.* (*C.*) *tepperi; d, C.* (*Nilodorum*) *biroi; e, C.* (*Kiefferulus*) *martini; f, C.* (*K.*) *intertinctus.*

Type.—Holotype ♂ from Nepean R., near Penrith, N.S.W. (MM) (seen by author).

Additional specimens seen.—QUEENSLAND: Eidsvold, Sept. 1923, T. L. Bancroft, 3 ♂♂; Cairns, 1 ♀, Innisfail, 2 ♀♀, Berner Creek, 2 ♀♀, F. H. Taylor. NORTHERN TERRITORY:

Manbulloo Station, July 1929, Mackerras and Campbell, 1 ♀ (CSIRO). SOUTH AUSTRALIA: Cairns district, A. M. Lea, 1 ♀ (SAM). WESTERN AUSTRALIA: Hammersley Range, Fortescue R., W. W. Dodd, 1 ♂; Millstream Station, July 1958, J. A. L. Watson, 1 ♂, 1 ♀.

CHIRONOMUS (CHIRONOMUS) AUSTRALIS Macquart

Chironomus australis Macquart, 1847, p. 9. Skuse, 1889, p. 254. Kieffer, 1906, p. 16; 1917, p. 208.

Chironomus applicatus Walker, 1856*a*, p. 424. Skuse, 1889, p. 251 (syn. nov.).

Chironomus duplex Walker, 1856*a*, p. 424. Skuse, 1889, p. 252. Kieffer, 1906, p. 17; 1917, p. 205 (syn. nov.).

Chironomus imitans Walker, 1856*a*, p. 425. Skuse, 1889, p. 252. Kieffer, 1906, p. 18; 1917, p. 206 (syn. nov.).

Chironomus occidentalis Skuse, 1889, p. 230. Kieffer, 1906, p. 20; 1917, p. 209 (syn. nov.).

Orthocladius applicatus Kieffer, 1906, p. 27; 1917, p. 228.

A large greyish species, thoracic markings blackish, intermediate areas dull greyish pruinose, abdomen with black markings on anterior two-thirds of each segment; legs pale, anterior tarsi of male strongly bearded, L. R. only about 1·2–3. Most easily separated from other species by its larger size and strongly bearded male tarsi.

Wing length.—5–7·5 mm.

Male.—*Head* greyish brown, pruinose, antennae brown, A.R. about 5, frontal tubercles present, mouthparts dark brown. *Thorax* with grey pruinosity all over, through which stripes, postnotum, and sternopleuron appear black or very dark; intermediate areas brown, yellowish brown, or greenish but heavily coated with dull grey pruinosity which only shimmers slightly on shoulders of some specimens. *Legs* yellowish and without distinct markings, anterior tarsi with long, strong beard, L.R. only about 1·2–1·3, posterior leg ratio 0·75. *Wings* with anterior veins rather dark so that crossvein does not appear conspicuously darker, posterior veins pellucid, halteres yellowish. *Abdomen* of most specimens with basal two-thirds of each segment blackish, but darker specimens have nearly all the segment blackish; apex of segments yellowish brown and pruinose. Hypopygium very similar to *nepeanensis*, styles possibly not always so narrow, anal point similar in lateral aspect.

Female.—Resembles male but generally darker especially on abdomen.

Types.—The holotypes of *australis, applicatus, duplex,* and *imitans* (type locality of all: Tasmania) are in the BM. Holotype of *occidentalis* (type locality: King George Sound, W.A.) is in the MM (also seen by author). All appear to belong to the same species.

Additional material seen.—AUSTRALIAN CAPITAL TERRITORY: Black Mountain, Sept. 1930, L. F. Graham, 1 ♀, and Apr.–May 1960, I. F. B. Common, 1 ♂, 1 ♀ (CSIRO); Canberra, Nov. 1936, W. J. Rafferty, 1 ♂ (CSIRO). VICTORIA: Altona, Oct. 1928, C. Borch, 1 ♀ (NM); Lake Burrumbeet, Mar. 1954, N. McCarce, 6 ♂ ♂ (NM); Ballarat, Apr. 1954, E. F. Riek, 3 ♂ ♂, 4 ♀ ♀ (CSIRO); Melbourne, 2 ♂ ♂, 5 ♀ ♀ (NM). TASMANIA: Oatlands, 5 ♂ ♂, 2 ♀ ♀ (CSIRO). SOUTH AUSTRALIA: Poltol Loch, Nov. 1956, E. W. Lines, 1 ♂ (SAM); Murray Bridge, 1 ♂ ♂, 3 ♀ ♀ (SPHTM). WESTERN AUSTRALIA: Lake Monger, Mar. 1955, D. H. Edward 6 ♂ ♂, 5 ♀ ♀; Esperance, Apr. 1958, J. A. L. Watson, 1 ♂; Swan R., J. Clark, 1 ♂ (SPHTM); Crawley, K. R. Norris, 2 ♀ ♀ (CSIRO).

CHIRONOMUS (CHIRONOMUS) ALTERNANS Walker

Chironomus alternans Walker, 1856*a*, p. 423. Skuse, 1889, p. 251.
Chirinomus oppositus Walker, 1856*a*, p. 425. Skuse, 1889, p. 253 (syn. nov.).
Chironomus egregius Skuse, 1889, p. 232. Kieffer, 1906, p. 17; 1917, p. 206 (syn. nov.).
Chironomus pervagatus Skuse, 1889, p. 233. Kieffer, 1906, p. 21; 1917, p. 209 (syn. nov.).
Chironomus subdolus Skuse, 1889, p. 236. Kieffer, 1906, p. 22; 1917, p. 206 (syn. nov.).
Chironomus januarius Skuse, 1889, p. 239. Kieffer, 1906, p. 19; 1917, p. 206 (syn. nov.).
Orthocladius alternans Kieffer, 1906, p. 26; 1917, p. 228.
Orthocladius oppositus Kieffer, 1906, p. 28; 1917, p. 228.
Chironomus imberbis Kieffer, 1917, p. 210 (syn. nov.).
Chironomus tenuiventris Kieffer, 1917, p. 217 (syn. nov.).
Chironomus arcuatus Kieffer, 1917, p. 219 (syn. nov.).

A medium-sized species, anterior tarsi not bearded, L.R. 1·5–1·7; thorax greenish or brownish with dark stripes and pruinose, usually with partial silvery pruinosity; legs unmarked, abdomen with dark markings.

This species is variable in colour in different localities and seems to represent the Palaearctic species *cingulatus* which it closely resembles. Its colour varieties have been described under different names, but I have been quite unable to find constant characters amongst museum material to maintain their separation and have been forced to regard them as belonging to one widely distributed, common and variable species.

Wing length.—2·8–5·0 mm.

Male.—*Head*, antennae, and mouthparts varying from light to dark brown, frontal tubercles present, A.R. about 4. *Thorax* with greenish or yellowish brown or darker background; stripes, postnotum, and sternopleuron varying from reddish brown to black; whole thorax pruinose, more strongly so on paler areas, partially silvery on shoulders and between stripes. *Legs* greenish or yellowish brown, without definite dark markings, L.R. 1·5–1·7. *Wings* with anterior veins hardly darker than posterior, crossvein slightly darkened. *Abdomen* greenish, yellowish, or brownish with black markings either as more or less saddle-shaped spots or else occupying basal two-thirds of segments; incisures pruinose. Hypopygium similar to *nepeanensis,* anal point similarly broad basally in lateral aspect.

Female.—Resembles male, usually rather darker especially on abdomen.

Types.—I have seen the holotype males of *alternans* (type locality New South Wales) and *oppositus* (type locality Tasmania) (both in BM), of *januarius* (type locality Wheeny Creek, N.S.W.), and the type series of *egregius* (from Sydney and Hexham, N.S.W., and Brisbane, Qld.), *pervagatus* (from Lawson, Berowra, and Sydney, N.S.W.) and *subdolus* (from Clifton, N.S.W.) (all in MM). I have selected lectotypes for the last three species as follows: *egregius*, ♂, with no data but probably from Sydney; *pervagatus*, ♀, from Sydney; *subdolus*, ♂, from Clifton. I have not seen the types of Kieffer's species, which were in the Hungarian National Museum; *imberbis* and *tenuiventris* were described from males from Sydney, *arcuatus* from a female from Mt. Victoria, N.S.W. All agree closely with the present species.

Additional specimens seen.—I have seen specimens of both sexes, often in long series, from the following localities: QUEENSLAND: Burpengary, Brisbane, Townsville. NEW SOUTH WALES: Manning R., Narooma, Tallong, Sydney, Blue Mountains, Hornsby, Dee Why, Jenolan Caves, Tarro, Mt. Koscuisko, Yass. AUSTRALIAN CAPITAL TERRITORY: Canberra, Blundell's, Black Mountain, Gungahlin. VICTORIA: Melbourne, Ocean Grove. TASMANIA: Mangalore, Wilmot, Eaglehawk Neck, Mt. Farrel, Cradle Valley, Lake Margaret, Harz Mountains, Fern Tree. SOUTH AUSTRALIA: Adelaide. WESTERN AUSTRALIA: Young River Outpost, Gin Gin Brook East, Muchea, Kalgan R., Lake Monger, Lake Gwellup, Ellen Brook, Esperance, Wilgarup R., Membenup, Perup R., Lefroy Brook, Millstream Station, Crawley.

CHIRONOMUS (CHIRONOMUS) VITELLINUS, sp. nov.

Thorax of a yolky colour, dull with practically no pruinosity; legs whitish especially on tibiae, tarsal segments black at joints; abdomen without dark markings but quite strongly pruinose at incisures and on segments 5 and 7; anal point of male narrow at base in side view. The white legs with dark marked tarsi and the pale abdomen make this species easily recognized; the hypopygium is also characteristic.

Wing length.—2·5–3·0 mm.

Male.—*Head*, mouthparts, and antennae yellowish brown, plumes paler, frontal tubercles present, A.R. about 4·5. *Thorax* of a dull reddish yellow, yolky colour, very slightly pruinose near the front; shoulders and intermediate areas slightly tinged with greenish; dorsocentral bristles only present in posterior half of thorax. *Legs* with femora very pale green, tibiae and tarsi whitish, the tarsi have definite black markings across the joints between segments; anterior tarsi not bearded, L.R. about 1·8. *Wings* pale, crossvein darkened. *Abdomen* yellowish green, lacking definite dark markings; incisures and segments 5 and 7 with quite strong pruinosity; hypopygium (Fig. 19, *b*) with anal point narrow at base, curved and finger-like in lateral aspect; appendage 2 short and stout, styles broad at base and rather sharply narrowed at apex.

Female.—Resembles male; sensory hairs on apical antennal segment longer than usual.

Types.—Holotype ♂ and paratype ♂ and ♀ from Darwin, Feb. 1915, G. F. Hill. Further paratypes: NEW SOUTH WALES: Manning R., Kundibakh, G. Dennes, 1 ♀. PAPUA: Mafulu, 4000 ft, Jan. 1934, L. E. Cheesman, 4♂♂, 3♀♀. One male paratype in SAM, holotype and remainder of series in BM.

CHIRONOMUS (CHIRONOMUS) MAGNIVALVA Kieffer

Chironomus magnivalva Kieffer, 1917, p. 219.

Antennae and legs rather short, thorax greenish, stripes brown, abdomen somewhat flattened, male hypopygium not unlike *tepperi* at first sight, but appendage 2 of a more normal, elongate form. This species seems allied to *tepperi* on account of the shape of the styles; it is readily recognized from Kieffer's figure and appears only to be known from Townsville.

Wing length.—2·4–2·5 mm.

Male.—*Head* and mouthparts greenish, antennae browner, A.R. about 2·5, antennae rather short. *Thorax* greenish, stripes either brown or partially brown, dorsocentral bristles not arising from very distinct pits, thorax slightly shining.

Legs darkened at the knees, somewhat shorter than in most species but not as short as in *tepperi*; L.R. 1·7, posterior L.R. about 0·5, whole posterior tarsus less than one and a half times length of tibia. *Abdomen* rather flattened, brownish green. Hypopygium similar at first sight to *tepperi*, but examination shows resemblance confined to anal point, appendage 1, and styles; appendage 2 not swollen, but of normal elongate form, styles not rounded as they are in *tepperi*.

Female.—Resembles male in colour and general appearance.

Type.—Holotype ♂ from Townsville, Qld., was in the Hungarian National Museum.

Specimens seen.—Townsville, Qld., A. K. O'Gower, 22.i.1959–12.ii.1959, 31 ♂♂, 16 ♀♀.

CHIRONOMUS (CHIRONOMUS) TEPPERI Skuse

Chironomus tepperi Skuse, 1889, p. 244. Kieffer, 1906, p. 22.

Medium-sized dark species with dull grey pruinosity; antennae short, A.R. about 2, pits of dorsocentral bristles dark and distinct; legs short, posterior basitarsus less than half as long as tibia, male hypopygium with appendage 2 greatly enlarged and styles short and oval.

This is a distinctive species with an unusual male hypopygium, probably most closely related to species of the subgenus *Camptochironomus*. On account of the presence of appendage 1 and absence of lateral lobes on 9th tergite, together with reduction of styles, I prefer to leave it in a rather indefinite position in the typical subgenus.

Wing length.—2·8–4·0 mm.

Male.—*Head*, mouthparts, and antennae yellowish brown or grey; palpi well developed, frontal tubercles small, antennal plumes whitish, antennae rather short, A.R. about 2. *Thorax* dark and thickly clothed with dull grey pruinosity through which stripes and other dark areas can be seen; scutellum pale; dorsocentral hairs irregularly biserial, yellow but arising from distinct dark pits. *Legs* yellow, darkened at knees, widely so on front pair, and at tips of tibiae and of tarsal segments; anterior tarsi not bearded, L.R. about 1·75; posterior tarsi shorter and thicker than usual, basitarsus less than half as long as tibia, whole tarsus often hardly longer than tibia. *Wings* with normal venation, crossvein slightly darkened. *Abdomen* dark and pruinose, each segment paler apically. Hypopygium (Fig. 19, *c*) highly characteristic; anal point deep in lateral aspect, laterally flanged as in *Camptochironomus tentans* F. (Palaearctic region); appendage 1 straight and pointed, appendage 2 greatly enlarged, rounded in lateral aspect, densely hairy on inner surface; styles short and oval, small in comparison with appendage 2.

Female.—Resembles male but is usually darker.

Types.—The type series consists of two much damaged females in the South Australian Museum (not seen by author). It seems clear from the description that this is the species Skuse had before him. Type localities Mt. Lofty and Adelaide, S. Aust.

Distribution of specimens seen.—QUEENSLAND: Burpengary, T. L. Bancroft, 4 ♂♂, 2 ♀♀; Innisfail, Jan. 1959, J. L. Harrison, 2 ♀♀ (BM); Eidsvold, T. L. Bancroft, 2 ♂♂, 4 ♀♀; Watten, F. H. Taylor, 4 ♀♀; Townsville, F. H. Taylor, 3 ♀♀. NEW SOUTH WALES:

Lake Illawarra, Jan. 1948, R. H. Wharton, 10 ♂♂, 2 ♀♀; Griffith, Nov. 1956, W. W. Wirth, 9 ♂♂, 1 ♀; Hornsby, Apr. 1956, W. W. Wirth, 1 ♀; Belaringar, Sept. 1923, 2 ♂♂, 4 ♀♀ (SPHTM); Sydney, Sept. 1923, 1 ♀ (SPHTM); Nyngan, Sept. 1923, 1 ♂ (SPHTM); Trangie, Jul.–Aug. 1952, B. Cameron, 1 ♂, 13 ♀♀ (CSIRO); Yass, K. English, 1 ♂, 2 ♀♀. AUSTRALIAN CAPITAL TERRITORY: Black Mountain, A. L. Tonnoir, 3 ♀♀, and H. M. Barnes, 2 ♂♂, 1 ♀ (CSIRO); Canberra, Nov. 1956, W. W. Wirth, 6 ♂♂. VICTORIA: Melbourne and district, G. F. Hill, F. E. Wilson, A. D. Selby, 7 ♂♂, 12 ♀♀ (NM); Sandringham, T. D. A. Cockerell, 1 ♂, 1 ♀ (USNM); Sea Lake, Chiltern, and Pianglo, Sept. 1959, N. Dobrotworsky, 8 ♂♂, 15 ♀♀ (BM). SOUTH AUSTRALIA: Adelaide, May, 1956, N. B. Tindale, 6 ♂♂, 14 ♀♀ (SAM); Didicoolum, Oct. 1956, R. V. Southcott, 3 ♂♂, 3 ♀♀ (SAM); Mt. Eyre, May 1956, G. F. Gross, 3 ♀♀ (SAM). WESTERN AUSTRALIA: Millstream Station, July 1958, J. A. L. Watson, 1 ♂, 5 ♀♀; Leederville, Aug. 1955, D. H. Edward, 4 ♀♀; Lake Grace, D. H. Edward, 3 ♂♂, 3 ♀♀; Esperance, Apr.–May 1958, D. H. Edward, 3 ♂♂, 5 ♀♀; Perth, Aug. 1926, 1 ♂ (SPHTM).

Genus CHIRONOMUS Meigen

Subgenus NILODORUM Kieffer

Nilodorum Kieffer, 1921*a*, p. 272. Freeman, 1957, p. 374 (as subgenus of *Chironomus*).

Type species *Nilodorum brevibucca* Kieffer, 1922

Frontal tubercles absent, mouthparts and palpi reduced, often greatly so; antennae thick, plumes bushy; prothorax narrow, reaching up to front of mesonotum but divided as in *Dicrotendipes*; thorax smooth and rounded in lateral aspect and heavily pollinose, bristles short, pale, and inconspicuous; anterior tarsi of male usually heavily bearded; male hypopygium with both appendages 1 and 2 fully developed, appendage 2 large and often racket-shaped.

The smooth rounded appearance of the thorax with its thick coating of dull grey dusting, combined with the short palpi, makes this subgenus easy to recognize. A single species is known to the author from Australia.

CHIRONOMUS (NILODORUM) BIROI Kieffer

Chironomus biroi Kieffer, 1918*a*, p. 108.

Pale brownish species, abdomen without bands; male anterior tarsi bearded; appendage 2 of hypopygium not as broad as in other species of the subgenus, long and curved, and with numerous hairs. This species was described from Ceylon, but the Australian specimens agree very well with the original description and figure and also with Indian specimens from Assam and Bihar.

Wing length.—3–3·25 mm.

Male.—Head, mouthparts, and antennae yellowish brown, pedicel reddish, frontal tubercles absent, A.R. about 4·5, palpi short, though not as short as in the type species. *Thorax* with yellowish brown background and brownish stripes, postnotum, and sternopleuron, the whole overlaid with greyish dusting. *Legs* yellowish, apices of anterior femora slightly darkened, anterior tarsi with long beard, pulvilli well developed, L.R. 1·3. *Wings* with crossvein slightly darkened, halteres pale. *Abdomen* brown and slightly pruinose, hairs pale; hypopygium

(Fig. 19, *d*) with stout claspers, simple anal point and appendage 1; appendage 2 long and curved, with numerous hairs at apex.

Female.—Similar to male.

Types.—The type series was in the Hungarian National Museum (type locality Colombo, Ceylon) (not seen by author).

Specimens seen.—Townsville, Qld., F. H. Taylor, 2 ♂♂. As mentioned above, additional material from Assam and Bihar has been seen.

Genus CHIRONOMUS Meigen

Subgenus KIEFFERULUS Goetghebuer

Kiefferulus Goetghebuer, 1922, p. 40.

Pentapedilum, subgenus *Kiefferulus* Edwards, 1929, p. 375.

Chironomus, subgenus *Kiefferulus* Townes, 1945, p. 110.

Chironomus, subgenus *Dicrotendipes* Freeman, 1957, p. 356 (in part).

Type species *Tanytarsus tendipediformis* Goetghebuer, 1921.

The species of this subgenus are very similar in appearance and thoracic structure to *Dicrotendipes* but can be separated by the racket-shaped appendage 2 of the male hypopygium. The African species *chloronotus* Kieffer also belongs here.

The type species has a few macrotrichia on the wing membrane at the apex; this, however, does not appear here to be of generic significance.

KEY TO AUSTRALIAN SPECIES OF THE SUBGENUS KIEFFERULUS

Appendage 1 beaked (Fig. 19, *e*); wing length 2–2·5 mm; antennal segments of female spindle-shaped .... *martini,* sp. nov.

Appendage 1 simple (Fig. 19, *f*); wing length 3–4·25 mm; segments 3–5 of female antenna with long necks .... *intertinctus* Skuse

CHIRONOMUS (KIEFFERULUS) INTERTINCTUS Skuse

Chironomus intertinctus Skuse, 1889, p. 234. Kieffer, 1906, p. 19; 1917, p. 207.

Chironomus hexhamensis Skuse, 1889, p. 237. Kieffer, 1906, p. 18; 1917, p. 27 (quoted in error as a new species) (syn. nov.).

Chironomus lativalva Kieffer, 1917, p. 211 (syn. nov.).

Green or yellowish green species, thoracic stripes, postnotum, and sternopleuron reddish yellow, brown, or blackish, frontal tubercles absent, anterior tibia and tarsus brown or black. This species is extremely similar to the African species *chloronotus* Kieffer, but the leg proportions are different and the frontal tubercles absent.

Wing length.—3·0–4·25 mm.

Male.—*Head* green, mouthparts and antennae brown, A.R. about 3, frontal tubercles absent. *Thorax* green or yellowish, stripes and other markings reddish yellow, brown, or partially blackish. *Legs* greenish or yellowish; apex of anterior femur, entire tibia, and tarsus black, tibiae may sometimes be paler centrally, other legs sometimes vaguely dark at knees, tarsi progressively darker towards apex; beard absent, L.R. 1·8, anterior femur one and a third times as long as tibia. *Wings* unmarked, bare, posterior fork slightly distal to crossvein, squama fully fringed, halteres yellowish green. *Abdomen* clear green; hypopygium (Fig. 19, *f*) distinctive on account of broad, racket-shaped appendage 2, styles fairly broad.

Female.—Resembles male; segments 3–5 of antenna with long necks which are as long as basal bulbous part.

Types.—I have seen the cotypes of *intertinctus* which are in the Macleay Museum (type localities Wheeny Creek, Hawkesbury district, and Hexham Swamps, N.S.W.; Brisbane, Qld.) and I have selected the solitary male from Brisbane as lectotype. I have also seen the cotypes of *hexhamensis* (type localities Hexham and Adelaide), which are in the Macleay Museum and South Australian Museum, and I have selected a male from Hexham in the Macleay Museum as lectotype. The type series of *lativalva* (type locality Sydney) was in the Hungarian National Museum, but the species is readily recognizable from the figure of the male hypopygium; from the figure of the antenna, it is possible that the female belongs to a different species.

Additional specimens seen.—QUEENSLAND: Brisbane, A. J. Turner, 2 ♂♂, 4 ♀♀ (SPHTM); Eidsvold, T. L. Bancroft, 1 ♂; Mt. Molloy, F. H. Taylor, 1 ♂, 1 ♀; "S. Queensland", T. L. Bancroft, 7 ♂♂, 2 ♀♀. NEW SOUTH WALES: Far North Coast, F. H. Taylor, 4 ♂♂, 9 ♀♀; Hornsby, D. J. Lee, 3 ♂♂, 25 ♀♀; Mosman, Jan. 1957, W. W. Wirth, 8 ♂♂, 5 ♀♀. AUSTRALIAN CAPITAL TERRITORY: Black Mountain, I. F. B. Common, 1 ♂, 1 ♀, and H. M. Barnes, 1 ♀ (CSIRO); Canberra, Nov. 1956, W. W. Wirth, 2 ♂♂, 1 ♀. VICTORIA: Swan Hill, Jan. 1931, F. E. Wilson, 1 ♂, 1 ♀. SOUTH AUSTRALIA: Murray Bridge, Lea, 1 ♂ (SAM). WESTERN AUSTRALIA: Fremantle, Feb. 1934, K. R. Norris, 2 ♂♂ (CSIRO); Esperance, Apr. 1958, D. H. Edward, 2 ♂♂, 4 ♀♀; Perup R., May 1958, D. H. Edward, 4 ♂♂, 2 ♀♀; Lake Claremont, June 1958, D. H. Edward, 1 ♂, 3 ♀♀; Franklin, May 1958, D. H. Edward, 3 ♂♂, 2 ♀♀.

CHIRONOMUS (KIEFFERULUS) MARTINI, sp. nov.

Pale green species, thoracic markings yellowish; frontal tubercles absent, segments 3–5 of female antenna spindle-shaped; anterior tibia slightly darkened, other legs, wings, and abdomen unmarked; hypopygium with racket-shaped appendage 2, appendage 1 beaked.

Wing length.—2–2·5 mm.

Male.—*Head* green, mouthparts and antennae browner, frontal tubercles absent, A.R. about 3. *Thorax* green, slightly shining; stripes, postnotum, and sternopleuron yellowish. *Legs* green, anterior tibia and tarsi pale brownish, beard absent, L.R. 1·5. *Wings* quite unmarked, bare, halteres greenish. *Abdomen* green, unmarked; hypopygium (Fig. 19, *e*) with appendage 2 broad and racket-shaped, appendage 1 beaked, anal point very stout.

Female.—Resembles male; intermediate antennal segments spindle-shaped and without long necks.

Types.—Holotype ♂ and 2 ♂ and 2 ♀ paratypes from Echuca, Vic., J. Martin, 28.i.1960, in BM.

Genus CHIRONOMUS Meigen

Subgenus DICROTENDIPES Kieffer

Dicrotendipes Kieffer, 1913*b*, p. 23. Freeman, 1957, p. 356.

Type species *Dicrotendipes pictipennis* Kieffer, 1913 (= *pilosimanus* Kieffer, subsp. *quatuordecimpunctatus* Goetghebuer).

Frontal tubercles usually absent or small, palpi long; prothorax reaching up to front of mesothorax, but divided by a suture in the middle, closely applied to mesothorax and not collar-like; thorax rarely pruinose and then without silvery lines, often shining; wings sometimes with dark markings, male hypopygium with both appendages 1 and 2 present and fully developed; appendage 2 narrow basally, bowed ventrally and usually expanded distally with curved hairs at apex, sometimes forked or heart-shaped at apex. Full synonymy and further details of the group can be found in Freeman (1957).

KEY TO AUSTRALIAN SPECIES OF THE SUBGENUS DICROTENDIPES

1. Wings with definite pattern of spots or blackish bands 2
   Wings without definite pattern 4
2. Pale species, wing with small discrete oval black spots ....*pilosimanus* Kieffer
   Blackish species, wing with heavy black band beyond crossvein 3
3. All tibiae black, anterior basitarsus black basally, anal cell with large black spot ....*taylori*, sp. nov.
   Four posterior tibiae pale on basal halves, anterior basitarsus white basally, anal cell lacking large black spot ....*leei*, sp. nov.
4. Black species, halteres black, legs black, tarsi partially whitish ....*wirthi*, sp .nov.
   Body at least partially green, halteres pale; legs, except anterior pair, mainly pale 5
5. Small species, wing length 1·5 mm; squama with only 1 or 2 hairs, legs green ....*innisfailensis*, sp. nov.
   Larger species, wing length 2·5–4·0 mm, squama fully fringed, anterior tibiae and tarsi dark or brownish ....*conjunctus* Walker

CHIRONOMUS (DICROTENDIPES) LEEI, sp. nov.

Blackish species, but thoracic stripes separated, legs black, basitarsi and posterior 4 tibiae pale basally; wings with broad black band distal to crossvein, broader anterior to M_{3+4}, anal cell lacking definite black markings; appendage 2 of male hypopygium with a short dorsal branch or tubercle.

This and the following species belong to the same species group as *candidibasis* Edwards (Fiji), *melanocnemis* Edwards (Samoa), and the African species *collarti* Goetghebuer and *cordatus* Kieffer; it likewise possesses spines on the 6th abdominal sternite; it differs from all in the leg pattern and hypopygial structure.

Wing length.—2·2–3·0 mm.

Male.—*Head*, mouthparts, and antennae brownish or blackish, A.R. about 3, very small frontal tubercles present. *Thorax* shining and of dark appearance, but background really testaceous with stripes, postnotum and sternopleuron black, stripes separate; pleura with bluish pruinose "bloom". *Legs* black, trochanters yellow, 4 posterior tibiae yellow on basal halves or more; all basitarsi yellow on basal halves; L.R. practically 2. *Wings* with bold black band occupying basal half of cell R_5 and a similar area of cell M_2, stepped back in posterior fork cell to level of apex of *Cu*, and filling apex of anal cell; apex of wing darkened, anal cell with only a trace of a central brown spot; posterior fork below crossvein, squama fringed. Halteres yellow. *Abdomen* black, styles paler, sternite 6 with group of 5–6 stronger setae or spines; hypopygium (Fig. 20, *a*) with characteristic appendage 2 which carries dorsally a tubercle or branch set well back from apex.

Female.—Resembles male and shows same "stepped" wing pattern.

Types.—Holotype ♂ from Hornsby, N.S.W., 6.i.1958, D. J. Lee; paratypes (same locality and collector): 7.ii.1957, 1 ♀, 17.i.1958, 1 ♀, and 9.xii.1958, 1 ♂. Two paratypes in BM, holotype and other paratype returned to SPHTM.

CHIRONOMUS (DICROTENDIPES) TAYLORI, sp. nov.

Black species, tarsi partially white, wings with heavy black band. Easily distinguished from *leei* by the presence of a strong black spot in anal cell and by the black base to the anterior basitarsus. It is not unlike the Samoan species *melanocnemis* known only from the female, but the legs are darker, all the femora being totally black, and I prefer to treat it as a separate species for the present.

Wing length.—2·5 mm.

Male.—*Head*, antennae, and mouthparts dark brown, A.R. 3, small frontal tubercles probably present. *Thorax* shining black, no trace of separation of stripes, pleura with silvery "bloom", scutellum and postnotum matt. *Legs* black, trochanters yellow, all tibiae black; anterior basitarsus white with basal and apical fifths black, remainder of anterior tarsus black; posterior 4 tarsi yellowish white, segments 2–5 slightly brownish, L.R. 1·6. *Wings* with broad black band occupying basal two-thirds of cell R_5 and carried back evenly to hind margin so that only extreme apex of fork cell clear, not "stepped" as in *leei*; apex of wing clouded; anal cell with large central black spot; halteres black. *Abdomen* including hypopygium black, segment 6 with group of 10–12 spines ventrally; hypopygium (Fig. 20, *b*) with appendage 2 slightly heart-shaped at apex.

Female.—Resembles male.

Types.—Holotype ♂ from Innisfail, Qld., F. H. Taylor. Paratypes: Mt. Molloy, Qld., F. H. Taylor, 1 ♂; Sogeri, New Guinea, June 1947, R. H. Wharton, 1 ♀. One paratype retained in BM, holotype and other paratype returned to SPHTM.

CHIRONOMUS (DICROTENDIPES) WIRTHI, sp. nov.

Black species, thorax shining, basitarsi yellow, at least partially; wings practically clear, but, if held at an angle, faint indications of markings similar in extent to *taylori* can be seen; anal point of male broad and strongly turned-down. Although in colour and appearance this species resembles the two preceding ones, the structure of the male hypopygium is different and is more similar to the African species *kribiicola* Kieffer.

Wing length.—2·25 mm.

Male.—Head, antennae, and mouthparts dark brown, A.R. about 2·5. *Thorax* shining black, slightly pruinose. *Legs* black, trochanters yellow, anterior basitarsi yellow on basal three-quarters, remainder of that tarsus black; posterior 4 tarsi almost completely yellow, L.R. 1·8. *Wings* at first sight clear, but if held at an angle then faint traces of bands and spots similar to those of *taylori* can be

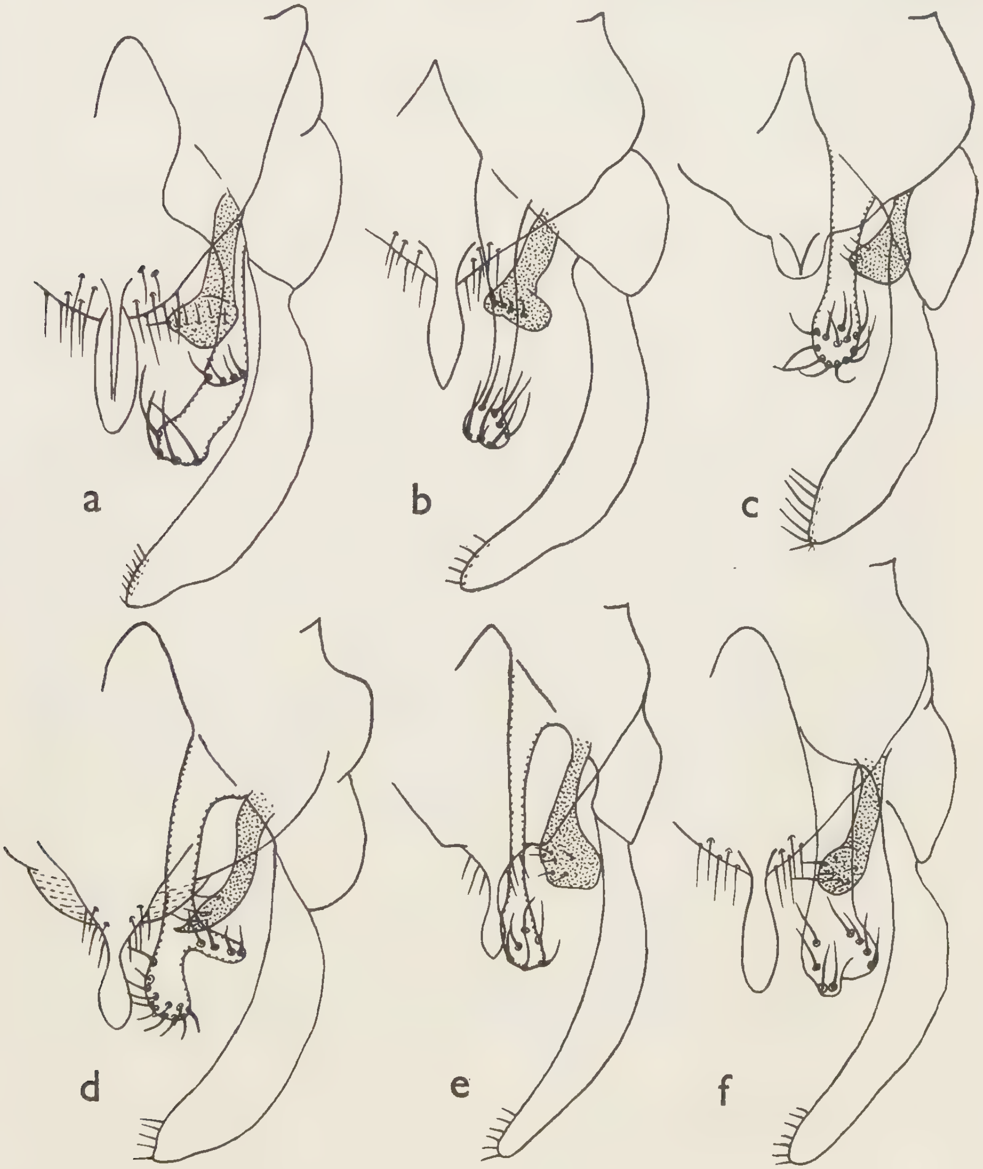

Fig 20.—Male hypopygia of *Chironomus* (*Dicrotendipes*): *a*, *C.* (*D.*) *leei*; *b*, *C.* (*D.*) *taylori*; *c*, *C.* (*D.*) *wirthi*; *d*, *C.* (*D.*) *pilosimanus*; *e*, *C.* (*D.*) *innisfailensis*; *f*, *C.* (*D.*) *conjunctus*.

distinguished; squama fringed, halteres black. *Abdomen* black, styles whitish; hypopygium (Fig. 20, *c*) with broad and deep anal point which is strongly flexed ventrally; appendage 2 simple.

Female.—Resembles male.

Types.—Holotype ♂ and 1 ♂ paratype from Mosman, N.S.W., Mar. 1957, W. W. Wirth. Further paratypes, same data, but Jan. 1957, 2 ♀♀. One paratype retained in BM, holotype and remainder returned to USNM.

CHIRONOMUS (DICROTENDIPES) PILOSIMANUS (Kieffer)

Dicrotendipes pilosimanus Kieffer, 1914, p. 262.

Chironomus (*Dicrotendipes*) *pilosimanus* Freeman, 1957, p. 360.

Pale, greenish yellow species, thoracic stripes reddish yellow or brown, anterior femora dark at apex, other knees pale; wings with 6 or 7 discrete black spots; appendage 2 of hypopygium strongly forked; anterior tarsi sparsely bearded.

The specimens described below are inseparable structurally and in leg and wing pattern from African specimens. There are also in the British Museum specimens from India (Punjab) and Palestine (Haifa) and there are records from Algeria, suggesting that the species has a wide distribution in the warmer parts of the Old World. Fuller details of the species and synonymy are given in Freeman (1957).

Wing length.—1·8–3·5 mm.

Male.—*Head* brownish, mouthparts darker, antennae brown, A.R. about 3·5, frontal tubercles large. *Thorax* green or yellowish, pruinose on shoulders, lateral margins, and prescutellar area; stripes reddish brown and more or less fused across. *Legs* pale yellowish green, apex of anterior femur and of all tibiae blackish, knees of posterior 4 legs unmarked; segments 1–3 of tarsi dark at apices, segments 4–5 brown, anterior tarsi with sparse but long beard; L.R. 1·5. *Wings* with 6 or 7 oval, discrete spots, the largest placed symmetrically over the base of M_{1+2}; 2 close together, 1 anterior to other and sometimes fused, near centre of cell R_5, 1 behind these in cell M_2, 1 in centre of fork cell, 2 in anal cell. *Abdomen* greenish and pruinose, some trace of darker markings centrally; hypopygium (Fig. 20, *d*) with branched appendage 2, the branch being nearly at right angles and removed from apex; appendage 1 evenly curved; 9th tergite with broad membranous extension beneath anal point.

Female.—Similar to male.

Specimens seen.—Townsville, Qld., F. H. Taylor, 5 ♂♂.

CHIRONOMUS (DICROTENDIPES) INNISFAILENSIS, sp. nov.

A small, pale greenish species, front femora one and a half times as long as tibia, L.R. 2; wings yellowish, posterior fork beyond crossvein, squama with only 1 or 2 fringe hairs; appendage 2 of hypopygium long and narrow, apex clubbed and not forked.

Wing length.—1·5 mm.

Male.—*Head*, mouthparts, and antennae yellowish brown, A.R. about 3, small frontal tubercles present. *Thorax* greenish and shining with yellowish brown stripes and other markings. *Legs* greenish, front femur one and a half times as long as tibia, L.R. 2. *Wings* with a yellowish tinge, squama with only 1 or 2 fringe hairs, posterior fork with rather straight branches; halteres greenish. *Abdomen* green; hypopygium (Fig. 20, *e*) with long narrow styles and appendage 2, appendage 1 clubbed.

Female.—Resembles male.

Types.—Holotype ♂ and paratype ♀, from Innisfail, Qld., F. H. Taylor. Holotype returned to SPHTM, paratype in BM.

CHIRONOMUS (DICROTENDIPES) CONJUNCTUS Walker

Chironomus conjunctus Walker, 1856*a*, p. 425. Skuse, 1889, p. 253.

Chironomus blandus Skuse, 1889, p. 238 (not *blandus* van der Wulp, 1858) (syn. nov.).

Chironomus blandellus Kieffer, 1906, p. 16 (nom. nov. pro *blandus* Skuse).

Dicrotendipes bilobatus Kieffer, 1917, p. 222 (syn. nov.).

Orthocladius conjunctus Kieffer, 1917, p. 228.

Green species, thoracic stripes varying from reddish yellow to black; legs green, front tibiae and tarsi blackish; wings unmarked; frontal tubercles well developed, front tarsi sometimes bearded in male, segments 3–5 of female antennae with short necks only, appendage 2 of hypopygium swollen apically and bilobed. There is some variation in the breadth of appendage 2 and the extent of bearding of the front tarsi, larger specimens tending to have narrower appendages and better-developed beard. More material may show these to be a separate species, which will require a new name, because all the existing names apply to specimens with broader appendages and no beard. It may be mentioned that studies by Mr. J. Martin of the larvae seem to suggest that more than one species is present.

Wing length.—2·5–4·0 mm.

Male.—*Head* greenish or brownish, mouthparts and antennae brown, A.R. about 3, frontal tubercles well developed. *Thorax* green or yellowish, stripes, postnotum, and sternopleuron reddish yellow, brown, or partially or completely black. *Legs* green, apex of anterior femur and whole of tibia and tarsus black or brown, other tarsi darkened towards their apices, L.R. about 2; larger specimens tend to have anterior tarsi bearded. *Wings* unmarked, posterior fork more or less below crossvein, squama fully fringed, halteres yellow. *Abdomen* of pale specimens clear green, but darker examples may have a dark suffusion or even narrow apical dark rings to the segments. Hypopygium (Fig. 20, *f*) with narrow styles, slightly clubbed appendage 1 and elongate appendage 2, bilobed at apex. In typical form, outer side of appendage 2 appears paler and more membranous, larger, more bearded specimens have a narrower stem to this appendage which is more uniformly sclerotized.

Female.—Resembles male in colour, antennae with segments 3–5 short, necks only half length of basal bulbs.

Types.—Male and ♀ cotypes of *conjunctus* in BM (type locality Tasmania); holotype ♀ of *blandus* in MM (type locality Narrabeen Lagoon, N.S.W.) (seen by author). The type of *bilobatus* was in the Hungarian National Museum but can be recognized from the description and figure (type locality Sydney).

Additional specimens seen.—QUEENSLAND: Mt. Molloy, F. H. Taylor, 1 ♂. NEW SOUTH WALES: Dee Why, Oct. 1956, W. W. Wirth, 9 ♂ ♂; Narrabeen, Oct. 1956, W. W. Wirth, 1 ♂; Hornsby, D. J. Lee, 2 ♂ ♂, 4 ♀ ♀; Tullamore, Sept. 1946, D. H. Colless, 1 ♂. AUSTRALIAN CAPITAL TERRITORY: Canberra, Nov. 1956, W. W. Wirth, 3 ♂ ♂. VICTORIA: Hamilton, June 1930, F. E. Wilson, 2 ♂ ♂; Altona, July 1928, F. E. Wilson, 2 ♂ ♂, 1 ♀; Ringwood, May 1928, F. E. Wilson, 1 ♂; Balnarring, Apr. 1929, F. E. Wilson, 1 ♂; Warrnambool, Aug. 1953, A. Neboiss, 1 ♂ (NM). TASMANIA: Advent Bay, Jan. 1922, A. L. Tonnoir, 2 ♂ ♂, 1 ♀; Strahan, Feb. 1923, A. L. Tonnoir, 1 ♀. WESTERN AUSTRALIA: Swan R., J. Clark, 4 ♂ ♂; Lake Monger, Oct. 1956, D. H. Edward, 4 ♂ ♂, 4 ♀ ♀; Esperance, Apr. 1958, D. H. Edward, 2 ♂ ♂, 3 ♀ ♀; Gin Gin, June 1958, D. H. Edward, 2 ♂ ♂; Fremantle, K. R. Norris, 1 ♂ (CSIRO).

Genus CHIRONOMUS Meigen

Subgenus XENOCHIRONOMUS Kieffer

Xenochironomus Kieffer, 1921*b*, p. 69. Freeman, 1957, p. 380 (as subgenus of *Chironomus*).

Type species *Chironomus xenolabis* Kieffer, 1916.

This subgenus is extremely similar to *Dicrotendipes* in general body characters but it may be distinguished by the male hypopygium in which the coxite appendages are showing reduction, though not as much as in *Cryptochironomus*: appendage 1 reduced to a pubescent lobe, appendage 2 reaching beyond end of coxite and with long hairs, anal point broad and deep in lateral aspect. A single species is known to the author from Australia.

CHIRONOMUS (XENOCHIRONOMUS) AUSTRALIENSIS, sp. nov.

Pale green species, thoracic markings reddish yellow, knees slightly darkened, anterior tarsi bearded, abdomen unbanded, appendage 1 of male hypopygium short and stout.

Wing length.—2·75–3·5 mm.

Male.—*Head* and mouthparts greenish, antennae pale brown, A.R. about 3, frontal tubercles absent. *Thorax* green with some pruinosity, stripes, postnotum, and sternopleuron reddish yellow. *Legs* pale green, knees slightly darkened, more noticeably on anterior femora, L.R. nearly 2, anterior tarsi with well-formed, though not dense, beard, pulvilli present. *Wings* unmarked, even at crossvein, halteres green. *Abdomen* clear green, without darker markings; hypopygium (Fig. 21, *a*) with anal point short, bulky, and strongly down-turned as in other species of the group, appendage 1 short, broad and hairy, appendage 2 well formed.

Female.—Not known.

Types.—Holotype ♂ and 3 ♂ paratypes from Oxford Falls, N.S.W., April 1922 (SPHTM). Further paratypes: Hornsby, N.S.W., Jan. 1958, D. J. Lee, 2 ♂ ♂; Molongolo R., A.C.T., Mar. 1930, L. F. Graham, 1 ♂ (CSIRO); Oatlands, Tas., Jan. 1948, Key, Carne, and Kerr, 1 ♂ (CSIRO). Two paratypes retained in BM, holotype returned to SPHTM, other specimens returned as indicated.

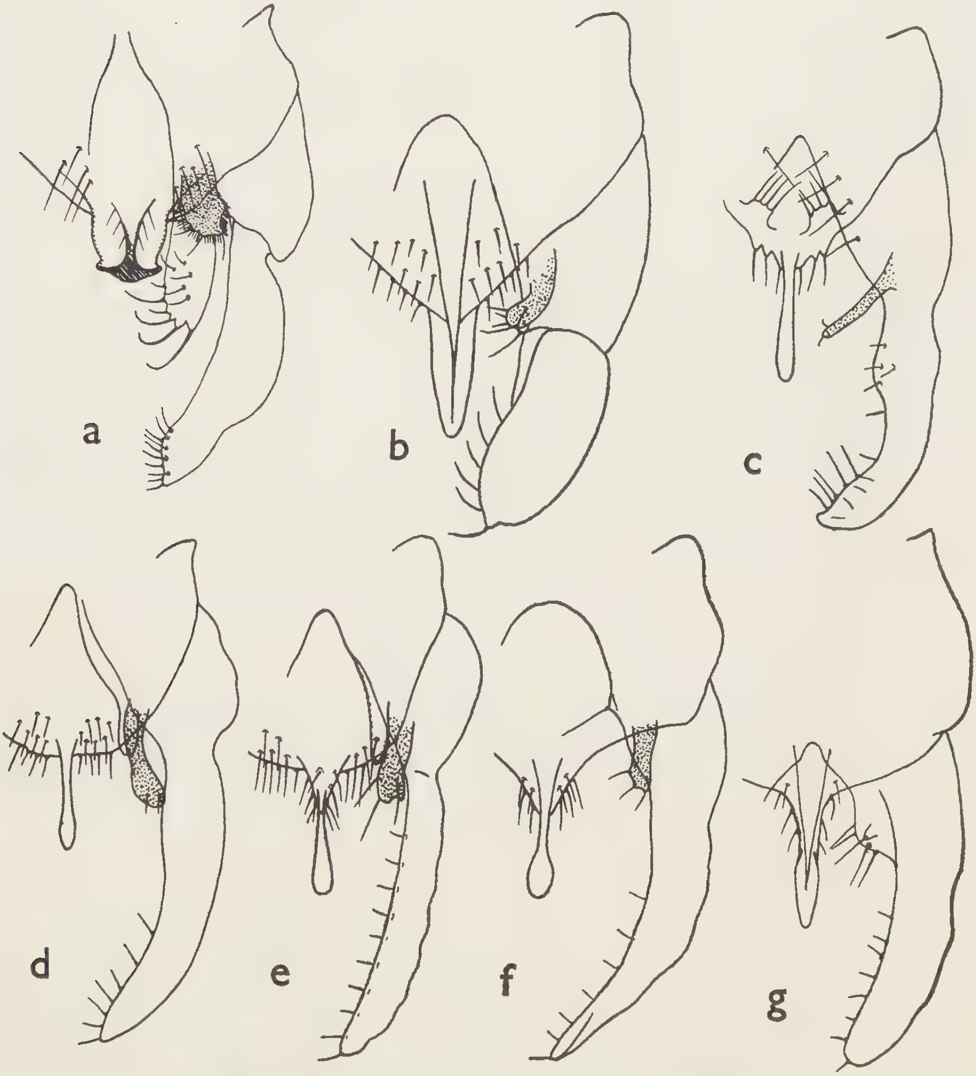

Fig. 21.—Male hypopygia of *Chironomus*: *a*, *C.* (*Xenochironomus*) *australiensis;* *b*, *C.* (*Cryptochironomus*) *griseidorsum;* *c*, *C.* (*Cr.*) *forcipatus;* *d*, *C.* (*Cr.*) *delinificus;* *e*, *C.* (*Cr.*) *angustus;* *f*, *C.* (*Cr.*) *curtivalva;* *g*, *C.* (*Cr.*) *dycei.*

Genus CHIRONOMUS Meigen

Subgenus CRYPTOCHIRONOMUS Kieffer

Cryptochironomus Kieffer, 1918*b*, p. 46. Freeman, 1957, p. 382.

This subgenus is employed as in Freeman (1957) to include all those species with appendage 2 of the male hypopygium greatly reduced or almost absent;

appendage 1 may be reduced also or reasonably well formed. The general characters of the group are similar to those of *Dicrotendipes* but there is a tendency for the last tarsal segment of the front legs to be dorsoventrally flattened. I am not able satisfactorily to divide the group on adult characters, although I am informed by Dr. H. Townes that excellent characters are to be found in the early stages to separate two groups, *Harnischia* and *Cryptochironomus*, s.s. Six species are known to me from Australia.

KEY TO AUSTRALIAN SPECIES OF THE SUBGENUS CRYPTOCHIRONOMUS

1. Thorax grey pruinose, stripes darker .... *griseidorsum* Kieffer
   Thorax yellowish or green 2
2. Male hypopygium with only 1 coxite appendage, or none 3
   Two coxite appendages present 5
3. Coxite appendages virtually absent (Fig. 21, *g*) .... *dycei*, sp. nov.
   Appendage 1 distinct 4
4. Appendage 1 long and narrow, 9th tergite with accessory lobes below (Fig. 21, *c*) .... *forcipatus* Freeman
   Appendage 1 shorter and stouter, accessory lobes absent (Fig. 21, *f*) .... *curtivalva* Kieffer
5. Anal point on a conical extension of 9th tergite (Fig. 21, *e*) .... *angustus*, sp. nov.
   Anal point not placed like this (Fig. 21, *d*) .... *delinificus* Skuse

CHIRONOMUS (CRYPTOCHIRONOMUS) GRISEIDORSUM Kieffer

Chironomus griseidorsum Kieffer, 1917, p. 218.

A medium-sized dark species with grey pruinosity on thorax; frontal tubercles present, anterior tibiae dark, slight beard present, male hypopygium with heavy styles and stout anal point. It is extremely similar to the African species *diceras* Kieffer, but it is best treated as a separate species because it is larger, the frontal tubercles are smaller, the front leg characters rather different, and the anal point stouter.

Wing length.—2·5–4·5 mm.

Male.—*Head* grey, pruinose, mouthparts brown, antennal pedicel darker, small frontal tubercles present, A.R 3. *Thorax* grey pruinose, with the 3 stripes, postnotum, and sternopleuron blackish and visible through the pruinosity; bristles whitish. *Legs* yellowish green; anterior pair with apex of femora, whole of tibiae and tarsi except base of basitarsi, blackish; short beard present on front legs, L.R. nearly 2; tibial combs separate. *Wings* unmarked, squama fringed, halteres whitish. *Abdomen* black, hairs white; hypopygium (Fig. 21, *b*) with massive styles, appendages 1 and 2 both present but 2 is the smaller, anal point very stout.

Female.—Resembles male.

Type.—Holotype ♀ (type locality Sydney) was in the Hungarian National Museum (not seen by author).

Australian material seen.—QUEENSLAND: Townsville, F. H. Taylor, 2 ♂♂, 1 ♀. NEW SOUTH WALES: Trangie, 1 ♂ (SPHTM); Lake Illawarra, Jan. 1948, R. H. Wharton, 1 ♀. TASMANIA: Lake Margaret, Feb. 1923, A. L. Tonnoir, 1 ♂, 1 ♀; Mt. Field, Dec. 1922, A. L.

Tonnoir, 1 ♂. WESTERN AUSTRALIA: Gin Gin, emerged from larva, 14.vi.1958, D. H. Edward, 1 ♂.

CHIRONOMUS (CRYPTOCHIRONOMUS) FORCIPATUS Freeman

Chironomus (*Cryptochironomus*) *forcipatus* Freeman, 1954, p. 20; 1957, p. 394.

This is an African species with a wide distribution on that continent; a single male from Queensland appears to be identical. It is a fairly small species, greenish, and with distinctive male hypopygium (Fig. 21, *c*).

Wing length.—1·5–2·0 mm.

Male.—*Head* greenish, frontal tubercles absent, pedicel reddish or black, A.R. about 2. *Thorax* green; stripes, postnotum, and sternopleuron either reddish or brown. *Legs* mostly green; front legs black or brown, femora paler in basal half especially beneath, L.R. 1·5, beard absent; tibial combs fused, spurs rather long. *Wings* plain, squama fringed, halteres pale. *Abdomen* pale or dark green; hypopygium (Fig. 21, *c*) quite characteristic, styles long, not separated from coxites and slightly swollen basally; single elongate coxite appendage present; anal point long, 9th tergite with a pair of small lobes beneath each carrying a few hairs.

Female.—Resembles male.

Australian specimen seen.—Innisfail, Qld., Jan. 1959, J. L. Harrison, 1 ♂ (BM).

CHIRONOMUS (CRYPTOCHIRONOMUS) DELINIFICUS Skuse

Chironomus delinificus Skuse, 1889, p. 239. Kieffer, 1906, p. 17; 1917, p. 206.

Only the holotype of this species is known; it is a small pale specimen, the abdomen having narrow darker rings; it is best identified from the male hypopygium in which the styles are long and hardly swollen basally, appendage 1 is curved outwards, anal point long but accessory lobes absent.

Wing length.—2·2 mm.

Male.—*Head*, mouthparts, and pedicel brown, flagellum paler, A.R. about 2, frontal tubercles probably absent. *Thorax* yellowish brown, lateral stripes brown, central one not darkened, postnotum and sternopleuron brown. *Legs* yellow, anterior tarsi missing. *Wings* unmarked, squama fringed, halteres pale. *Abdomen* pale yellowish green, each segment narrowly darkened at apex; *hypopygium* (Fig. 21, *d*) bearing a slight resemblance to *forcipatus* but 9th segment lacking accessory lobes; styles narrower and hardly swollen basally, appendage 1 rather clubbed and curved outwards, 2 smaller and lying beneath.

Female.—Not known.

Type.—Holotype ♂ (type locality Knapsack Gully, Blue Mountains, N.S.W.) in MM (seen by author); no other specimens known.

CHIRONOMUS (CRYPTOCHIRONOMUS) ANGUSTUS, sp. nov.

Dark green species with dark brown thoracic markings, legs pale brown, front pair darker, abdomen slightly darkened at incisures; male hypopygium with long narrow styles, 2 coxite appendages, and with anal point carried at apex of cone-like process of 9th tergite.

Wing length.—2·2 mm.

Male.—*Head* and mouthparts yellowish brown, pedicel darker, A.R. 1·7, frontal tubercles present. *Thorax* green and slightly pruinose; stripes, postnotum, and sternopleuron dark brown. *Legs* pale brown, anterior tarsi missing. *Wings* unmarked, halteres green. *Abdomen* dark green, incisures slightly darker; hypopygium (Fig. 21, *e*) with long narrow styles, appendage 1 irregularly broadened at apex, appendage 2 shorter, anal point carried at the apex of a cone-like process of the 9th tergite.

Female.—Not known.

Type.—Holotype ♂ from Oxford Falls, N.S.W., 2.ix.1956, W. W. Wirth, in USNM.

CHIRONOMUS (CRYPTOCHIRONOMUS) CURTIVALVA Kieffer

Chironomus pulcher Skuse, 1889, p. 240 (not *C. pulcher* Wiedemann, 1830). Kieffer, 1906, p. 21; 1917, p. 206.

Chironomus curtivalva Kieffer, 1917, p. 213.

Green species, thoracic markings reddish brown or blackish, legs green, front pair darker; most easily recognized by the male hypopygium in which the styles are evenly curved and tapered, only 1 coxite appendage is present and the anal point carried on the cone-shaped apex (not extension) of the 9th tergite.

Skuse's type is a female but it resembles other material seen by the author and almost certainly belongs to this species; unfortunately the name is a homonym and it is necessary to use Kieffer's name of which the type was in the Hungarian National Museum, but which can be recognized from the figure of the male hypopygium.

Wing length.—1·5–2·0 mm.

Male.—*Head* green, mouthparts brown, pedicel brown or black, A.R. 2, small frontal tubercles present. *Thorax* green; stripes, postnotum, and sternopleuron varying from reddish brown to black. *Legs* greenish, tarsi rather darker, front legs mainly dark, paler on basal half of femur, beard absent, L.R. 1·8. *Wings* unmarked, squama fringed, halteres green. *Abdomen* green, often dark; hypopygium (Fig. 21, *f*) with only a single coxite appendage, appendage 2 possibly being represented by a bristle arising from a tubercle; style and coxite fused, style curved and tapered; anal point broadened apically and arising from the cone-shaped apex of the 9th tergite.

Female.—Similar to male.

Types.—Holotype ♀ of *pulcher* in MM (type locality Summer Hill, near Sydney); type locality of *curtivalva* is Sydney.

Additional specimens seen.—NEW SOUTH WALES: Hornsby, Nov. 1957, D. J. Lee, 3 ♂♂; Narrabeen, W. W. Wirth, 1 ♂. VICTORIA: Ocean Grove, J. Martin, 1 ♂, 1 ♀ (BM). TASMANIA: Advent Bay, 1 ♂, and Strahan, 1 ♀, A. L. Tonnoir. SOUTH AUSTRALIA: Port Lincoln, 1 ♂ (SAM); Murray Bridge, 1 ♂ (SAM). WESTERN AUSTRALIA: Swan R., J. Clark, 1 ♂ (SPHTM); Membenup, 2 ♂♂, 3 ♀♀, and Esperance, 4 ♀♀, D. H. Edward.

CHIRONOMUS (CRYPTOCHIRONOMUS) DYCEI, sp. nov.

Green species with reddish brown thoracic markings, anterior legs mainly dark brown, coxite appendages virtually absent. Similar to other green species of the group, most easily separated by the male hypopygial structure.

Wing length.—1·7 mm.

Male.—*Head* green, frontal tubercles absent, antennae brownish, A.R. about 2. *Thorax* green; stripes, postnotum, and sternopleuron reddish brown. *Legs* yellowish green, anterior pair darker and more or less brown except for underside of femora, L.R. 2, beard absent. *Wings* unmarked, squama fringed, halteres green. *Abdomen* plain green; hypopygium (Fig. 21, *g*) lacking definite coxite appendages which are perhaps represented by an inner hairy lobe carrying a very small secondary lobe; anal point carried on a hairy extension of the tergite.

Types.—Holotype ♂ and 2 ♂ paratypes, Gungahlin, A.C.T., 17.i.1959, A. L. Dyce. One paratype retained in BM, holotype and other paratype returned to CSIRO.

Genus CONOCHIRONOMUS, gen. nov.

Chironomus, subgenus *Endochironomus* Freeman, 1957, p. 351 (in part).

Type species *Chironomus* (*Endochironomus*) *acutistilus* Freeman, 1955.

Male antenna 14-segmented, female antenna with 7 segments, frontal tubercles absent. Prothorax reaching up to front of mesonotum and continuing as a collar across the front, neither bilobed nor emarginate centrally, acrostichal bristles absent. Anterior tibia with oval scale not bearing a spur, middle and posterior tibiae with strongly conical combs each bearing a short spur at apex; pulvilli present. Vein R_{2+3} ending in costa slightly before midway between R_1 and R_{4+5}, squama with strong fringe. Male anal point carried on a conical pubescent extension of 9th tergite, appendage 2 short, stout, and hairy.

A second African species *C.* (*E.*) *avicula* Freeman is almost inseparable from this species except in the male genital characters where appendage 2*a* is present and appendage 1 of a different shape. It must be placed here despite the rather different genitalia. When these two species were described they were placed provisionally in *Endochironomus*, but it is now clear that they cannot be considered as members of that subgenus on account of the spur formation, prothoracic structure, shape of anal point and absence of acrostichal bristles. There are three specimens from Australia that cannot be distinguished from the type species.

CONOCHIRONOMUS ACUTISTILUS (Freeman), comb. nov.

Endochironomus acutistilus Freeman, 1955*c*, p. 288.

Chironomus (*Endochironomus*) *acutistilus* Freeman, 1957, p. 352.

A fairly large blackish species with grey dusted thorax, legs black, wings unmarked; male hypopygium with anal point on conical projection of tergite, appendage 1 divided and styles pointed.

Wing length.—3·5 mm.

Male.—*Head*, mouthparts, and pedicel blackish, flagellum and plumes more brownish, A.R. about 2·6. *Thorax* blackish or very dark brown, covered fairly uniformly with thin grey dusting. *Legs* blackish brown, paler only on trochanters, A.R. about 1·4, beard absent. *Wings* yellowish basally; halteres pale. *Abdomen* blackish brown, grey-dusted, and with dark bristles; hypopygium (Fig. 22, *a*) with anal point on hairy projection of tergite, styles pointed, appendage 1 in two parts.

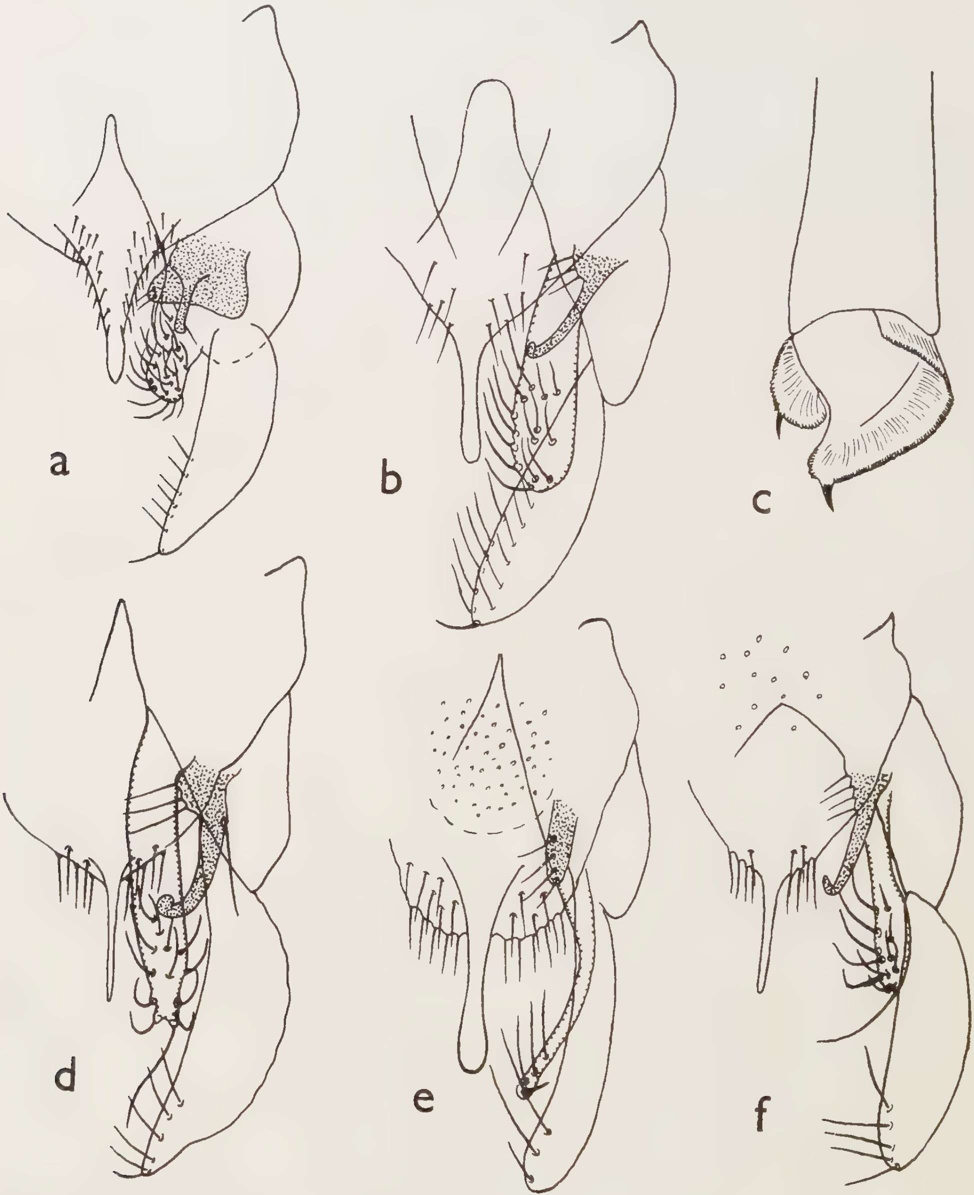

Fig. 22.—Chironominae: *a*, male hypopygium of *Conochironomus acutistilus; b*, hypopygium of *Imparipecten pictipes; c*, apex of left posterior tibia of *I. pictipes; d*, hypopygium of *Harrisius montanus; e*, hypopygium of *Stenochironomus watsoni; f*, hypopygium of *S. anomalus*.

Female.—Similar to male.

Specimens seen from Australia.—QUEENSLAND: Kuranda, Dec. 1920, E. P. Dodds, 1 ♂ (SPHTM); Eidsvold, Dec. 1922, 1 ♀, and Apr. 1924, 1 ♂, T. L. Bancroft. The species is also known from Africa south of the Sahara.

Genus IMPARIPECTEN, gen. nov.

Type species *Imparipecten pictipes*, sp. nov.

Male antenna with 14 segments, female antenna with 7; frontal tubercles absent. Prothorax well formed, similar to *Chironomus*, subgenus *Endochironomus*, terminating anteriorly in 2 small lobes or knobs; long acrostichal bristles present. Anterior tibial scale carrying small transparent point or spur; middle and posterior tibiae with combs at different levels (Fig. 22, *c*); on middle tibia the inner one unarmed and the outer one projecting well beyond it and carrying a short spur; on posterior tibia both combs spurred but inner one much the larger and projecting well beyond the outer; pulvilli present and large. Vein R_{2+3} closely applied to R_1 at apex and ending in costa in contact with it. Male hypopygium simple, styles more or less oval, coxite with 2 appendages, anal point present.

Superficially, this genus is very similar to the subgenus *Endochironomus* and to *Tribelos* Townes, but the formation of the tibial combs and the close approximation of veins R_1 and R_{2+3} suggest that a separate genus is to be preferred.

IMPARIPECTEN PICTIPES, sp. nov.

Thorax largely shining, blackish, abdomen yellowish and banded in the male, mainly dark in the female, basitarsi of all legs with a white band.

Wing length.—3·5–4·5 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. about 1·5. *Thorax* mainly shining blackish, but shoulders and scutellum yellowish. *Legs* with yellow femora which are more or less dark at tips especially anterior pair; tibiae of front legs blackish, of middle and posterior legs yellow and more or less brown at base and apex; tarsi dark brown or blackish, anterior basitarsi with a wide pure white band placed more or less centrally, although basal dark area shorter than apical; middle and posterior basitarsi with a similar band occupying basal half; posterior tarsi with another band on segment 3 and sometimes on segment 2 as well; L.R. only about 1·1. Wings unmarked even at crossvein, halteres brownish. *Abdomen* yellowish, each of segments 2–5 with a brown basal band, segments 6–9 blackish, claspers whitish, hypopygium (Fig. 22, *b*) simple.

Female.—Similar in leg and thoracic pattern to male but abdomen blackish with yellow colouring confined either to segment 1 or to segments 1 and 2.

Types.—Holotype ♂ and 2 ♂ and 2 ♀ paratypes, Burnie, Tas., Feb. 1923, A. L. Tonnoir. Further paratypes: NEW SOUTH WALES: National Park, 28.ix.1922, 1 ♂ (SPHTM), and Apr. 1925, I. M. Mackerras, 1 ♀ (CSIRO); E. Dorrigo, 30.i.1923, 1 ♀ (SPHTM). AUSTRALIAN CAPITAL TERRITORY: Blundell's, Jan. 1930, A. L. Tonnoir, 1 ♀; Cotter R., Mar. 1930, A. L. Tonnoir, 2 ♂ ♂, 5 ♀ ♀. TASMANIA: Geeveston, Dec. 1922, A. L. Tonnoir, 1 ♀; St. Patrick's R., Feb. 1914, 1 ♂ (SAM). Holotype returned to SPHTM, six paratypes retained in BM, remainder returned as indicated.

Genus HARRISIUS Freeman

Harrisius Freeman, 1959, p. 426.

Type species *Harrisius pallidus* Freeman, 1959.

Male antenna with 14 segments, female with 6, frontal tubercles absent. Pronotum much reduced and far surpassed by mesonotum which projects as a cone over the head; acrostichal bristles long and with distinct pits. Wing membrane thickly clothed with macrotrichia, squama fringed. Scale of anterior tibia oval and without spur, pulvilli present; combs of posterior tibiae fused and each with a spur. Male hypopygium with 2 pairs of coxite appendages, of a more normal form than in *Stenochironomus*, to which the thoracic structure shows some resemblance. Type species is from New Zealand.

HARRISIUS MONTANUS (Skuse), comb. nov.

Tanytarsus montanus Skuse, 1889, p. 268. Kieffer, 1906, p. 30; 1917, p. 224.

Tanytarsus cereolus Skuse, 1889, p. 270. Kieffer, 1906, p. 29; 1917, p. 224 (syn. nov.).

Colour variable, either pale green with yellowish or brownish thoracic markings or darker green with thoracic markings much darker and abdominal segments dark basally; macrotrichia usually present over most of wing surface but occasionally more or less absent from basal half, male hypopygium not unlike species of *Polypedilum*, rather different from the type species.

The specimens of this species seen by the author show considerable variation, some of the pale ones having more densely hairy wings, straighter R_{4+5}, and narrower styles, suggesting that they belong to a different species. However, not all of them are constant in these respects, and as some of the darker specimens approach them, it is necessary to regard all as belonging to one variable species. So far as can be seen, Skuse's species are identical, *cereolus* falling as a synonym; further collecting may show whether a second species is present or not.

Wing length.—2·0–2·5 mm.

Male.—*Head*, mouthparts, and antennae varying from pale green in light specimens to brown in darker ones; A.R. 1·7–2·0; frontal tubercles absent. *Thorax* green with yellowish stripes, postnotum and sternopleuron in pale specimens; in darker specimens, markings varying to dark brown. *Legs* greenish, or brownish, unmarked; L.R. about 1·3. *Wings* unmarked, macrotrichia may cover most of surface or they may be reduced in basal half; R_{4+5} varying from almost straight to quite strongly curved at apex; halteres pale. *Abdomen* either pale green, or each segment after the first with a brown basal band which may occupy as much as one-half of the segment; hypopygium (Fig. 22, *d* of lectotype) very similar to some species of *Polypedilum* and rather different from the New Zealand species of *Harrisius*, especially in the chaetotaxy of appendage 2; styles may be slightly wider or narrower.

Female.—Resembles male.

Types.—Cotypes of *montanus* (Blue Mountains, N.S.W.) and holotype of *cereolus* (Gosford, N.S.W.) in MM. The author has marked a male of *montanus* as lectotype.

Additional specimens seen.—NEW SOUTH WALES: Mosman, Mar. 1957, W. W. Wirth, 5 ♂♂, 1 ♀; Colo Vale, Mar. 1957, W. W. Wirth, 1 ♂; Narrabeen, Oct. 1956, W. W. Wirth, 1 ♂; Hornsby, Nov. 1957, D. J. Lee, 1 ♀. VICTORIA: Ringwood, May 1929, 1 ♂; Kinglake Valley, May–June 1929, 1 ♂, 1 ♀; Warburton, Apr. 1931, 2 ♂♂ (all coll. F. E. Wilson).

Genus STENOCHIRONOMUS Kieffer

Stenochironomus Kieffer, 1919, p. 44. Freeman, 1957, p. 409.

Type species *Tipula gibbus* Fabricius, 1794 (= *flexilis* auctt. nec Linnaeus).

Antennae of male with 14 segments, of female with 6; frontal tubercles absent, palpi normal. Pronotum much reduced and far surpassed by mesonotum which projects as a cone over head; acrostichal bristles long and easily visible as a double row extending back to the middle of the scutum. R_{2+3} close to R_1 at apex, wing membrane without macrotrichia, squama fringed. Scale of anterior tibia elongate and sometimes with a short spur at tip; pulvilli well developed; combs of middle and posterior tibiae fused, each with a spur in most species. Male hypopygium usually very characteristic; anal point upstanding and bent at apex; appendage 1 short and inconspicuous; appendage 2 long narrow and curved, with an articulated spine and a number of long hairs at the tip; styles long and with a few long hairs on their inner margins; in one Australian species the hypopygium is more normal.

As mentioned in Freeman (1957), most of the species of this genus are not easily separated by structural characters as these are few in number, and it seems that a concept of each species must be built on the general facies and colour pattern. For this reason I am only able to describe two Australian species, although I have seen single, often damaged, females of a number of others.

One of these two species is a normal *Stenochironomus* but the other, although possessing all the thoracic and leg characters of the genus, has the male hypopygium less like other members of the genus and more like, perhaps, a species of *Polypedilum*. On this character it approaches species of the *cinctus* group from America (see Townes 1945, p. 87) but it differs in the greater length of appendage 1. The two described species may be separated by the following key.

KEY TO AUSTRALIAN SPECIES OF THE GENUS STENOCHIRONOMUS

Abdomen banded, male hypopygium of typical form (Fig. 22, *e*) ....*watsoni*, sp. nov.

Abdomen unbanded, male hypopygium not of typical *Stenochironomus* form, appendage 1 elongate, appendage 2 not especially elongate, lacking movable spine at apex and with numerous bristles ....*anomalus*, sp. nov.

STENOCHIRONOMUS WATSONI, sp. nov.

Pale brownish species, legs and wings unmarked, L.R. 1·6, abdomen banded, male hypopygium similar to other species of the genus, anterior tibial scale with short point.

Wing length.—2·0–2·4 mm.

Male.—*Head* and antennae yellowish brown, palpi darker, A.R. about 2. *Thorax* pale brown or yellowish brown; stripes, postnotum, and sternopleuron darker brown but variable in intensity, bristles dark brown. *Legs* unbanded, yellowish brown, L.R. about 1·6, anterior tarsi not bearded, anterior femur and tibia subequal, scale with a short point but no distinct spur, other tibiae with 2 short spurs. *Wings* quite pale and unmarked even at crossveins; halteres pale. *Abdomen* yellowish brown with dark brown bands at apices of segments, sometimes occupying apical halves of segments; hypopygium (Fig. 22, *e*) similar to other species of the genus; anal point slightly spatulate, appendage 1 with row of 4 bristles, appendage 2 with movable spine at apex.

Female.—Similar to male.

Types.—Holotype ♂ and 3 ♂ and 2 ♀ paratypes from Millstream Station, W.A., July 1958, J. A. L. Watson. Other paratypes: QUEENSLAND: Mt. Molloy, F. H. Taylor, 3 ♂♂. VICTORIA: Werribee Gorge, Mar. 1929, F. E. Wilson, 1 ♂; Murray Valley, Nyah, J. Martin, 1 ♂. Five paratypes retained in BM, holotype returned to WAM, other paratypes returned as appropriate.

STENOCHIRONOMUS ANOMALUS, sp. nov.

Brownish or greenish with unbanded legs, wings and abdomen; male hypopygium quite characteristic and unlike other members of the genus, which it otherwise resembles in thoracic and other structural characters.

Wing length.—2·5–3·2 mm.

Male.—*Head*, mouthparts, and antennae brown, antennae with 14 segments, A.R. about 1·25. *Thorax* with greatly reduced prothorax and cone-shaped mesonotum, acrostichal bristles present as 2 well-formed rows; general colour brown, shoulders paler. *Legs* pale yellowish brown or greenish; anterior tibial scale well formed and more or less pointed, other tibiae with fused combs and 2 equal spurs, pulvilli present, L.R. about 1·25, beard absent. *Wings* quite unmarked, halteres pale. *Abdomen* unicolorous, brownish or greenish; male hypopygium (Fig. 22, *f*) unlike other species; anal point long and narrow; styles only slightly elongate; appendage 1 long, narrow, and bent ventrally at apex; appendage 2 only slightly lengthened, without movable spine at apex but with more hairs than usual.

Female.—Resembles male, antennae with 6 segments.

Types.—Holotype ♂ from King R., Tas., Feb. 1923, A. L. Tonnoir. Paratypes: AUSTRALIAN CAPITAL TERRITORY: Tinker's Creek, Uriarra, Apr. 1930, L. F. Graham, 1 ♂ (CSIRO); Pretty Point Creek, Dec. 1931, A. L. Tonnoir, 1 ♂ (CSIRO). VICTORIA: Sassafras, Nov. 1922, A. L. Tonnoir, 1 ♂ (SPHTM). TASMANIA: Eaglehawk Neck, Nov. 1922, A. L. Tonnoir, 1 ♂; Zeehan, Feb. 1923, A. L. Tonnoir, 3 ♂♂; Lake Margaret, Feb. 1923, A. L. Tonnoir, 1 ♂, 1 ♀. SOUTH AUSTRALIA: Aldgate, Oct. 1929, F. E. Wilson, 1 ♂. Four paratypes retained in BM, holotype returned to SPHTM, other specimens returned as appropriate.

Genus POLYPEDILUM Kieffer

Polypedilum Kieffer, 1913*a*, p. 15. Freeman, 1958, p. 266.

Type species *Polypedilum emarginatum* Kieffer (= *nubeculosum* Meigen).

Male antenna 14-segmented, female antenna 6-segmented. Pronotum moderately developed, acrostichal bristles well developed; anterior tibial scale with a short spur, middle and posterior tibial combs with only a single spur for each pair; pulvilli split longitudinally into narrow lobes (only clearly visible in slide mounts). Wing membrane bare in typical subgenus but with macrotrichia in subgenus *Pentapedilum*, wings either unmarked or with dark clouds and spots; squamal fringe complete. Eighth abdominal segment of male triangularly produced at the base so as to appear constricted; anal point well formed, appendage 2 usually with a long terminal hair.

This is one of the larger and better-defined genera of the family with species in all Zoogeographical Regions. A full account of the genus with complete synonymy may be found in Freeman (1958).

KEY TO AUSTRALIAN SPECIES OF THE GENUS POLYPEDILUM

1. Wing membrane bearing macrotrichia at least at apex (subgenus *Pentapedilum*) .... *leei*, sp. nov.
   Wing membrane without macrotrichia (subgenus *Polypedilum*) 2
2. Wings with spots or clouds 3
   Wings clear, at the most with some veins slightly grey-seamed, no distinct spots or clouds 6
3. Cell R_5 with 3 spots 4
   Cell R_5 with 1 or 2 spots 5
4. A distinct spot basal to crossvein in cell M_1 (Fig. 23, *b*) ......? *griseoguttatum* Kieffer
   No spot basal to crossvein (Fig. 23, *a*) .... *nubifer* (Skuse)
5. Cell R_5 with a dark spot at the base and another near the centre (Fig. 23, *c*) .... *watsoni*, sp. nov.
   Cell R_5 with a dark spot in the base only (Fig. 23, *d*) .... *tonnoiri*, sp. nov.
6. Veins M_{1+2}, M_{3+4}, and *Cu* bearing macrotrichia, M_{1+2} curved forwards .... *wirthi*, sp. nov.
   These veins bare, M_{1+2} not curved forwards 7
7. Legs pale, without any dark markings at the knees or on the femora 8
   Legs with some dark markings at knees or on femora 9
8. Pale yellowish or greenish species .... *seorsus* (Skuse)
   General colour dark brown or blackish .... *vespertinus* (Skuse)
9. Abdomen clear green .... *prasiogaster*, sp. nov.
   Abdomen dark and with pruinose bands at apices of segments ...... *oresitrophus* (Skuse)

POLYPEDILUM (POLYPEDILUM) NUBIFER (Skuse), comb. nov.

Chironomus nubifer Skuse, 1889, p. 249. Kieffer, 1906, p. 20; 1917, p. 205.
Chironomus tripartitus Kieffer, 1910, p. 231; 1913*c*, p. 150 (syn. nov.).
Chironomus ceylanicus Kieffer, 1911, p. 136 (syn. nov.).
Polypedilum pelostolum Kieffer, 1912*b*, p. 41 (syn. nov.).
Polypedilum pharao Kieffer, 1924, p. 274 (syn. nov.).
Polypedilum pruinosum Goetghebuer, 1934, p. 37 (syn. nov.).

Dark brown species, pruinose, legs whitish, tarsal beard present, wings with 3 dark spots in cell R_5, which are more or less duplicated in cell M_1, the basal one being closely applied to M_{1+2}; male hypopygium of simple type.

Specimens identical in colour and structure with Australian material are to be found in North Africa (Morocco and Egypt), Iraq, Ceylon, and Formosa and have been variously described under the names synonymized above. The wing markings are quite characteristic and, in combination with the whitish legs and tarsal beard, make the species easy to recognize, so that I have no hesitation in synonymizing all under the earliest name.

Wing length.—2·25–3·0 mm.

Male.—*Head*, mouthparts, and antennae dark brown, A.R. 3·5, frontal tubercles absent. *Thorax* blackish and pruinose, stripes fused. *Legs* whitish, femora brownish, tarsal beard long and sparse, L.R. 1·6. *Wings* with markings as in Figure 23, *a*, the spot in the base of cell R_5 and its associated one in cell M_1 being especially characteristic; halteres whitish. *Abdomen* blackish and without markings; hypopygium (Fig. 24, *a*) of a fairly simple type.

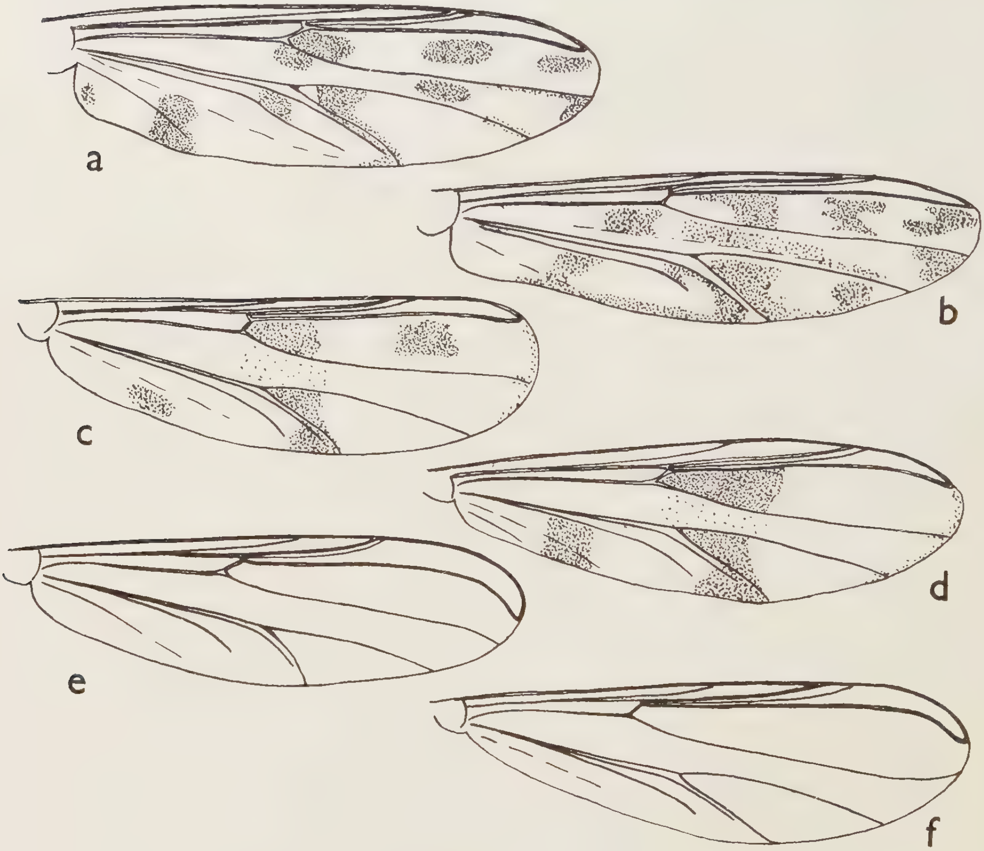

Fig. 23.—Wings of females of *Polypedilum*: *a*, *P. nubifer*; *b*, *P. ? griseoguttatum*; *c*, *P. watsoni*; *d*, *P. tonnoiri*; *e*, *P. oresitrophus*; *f*, *P. wirthi*.

Female.—Similar to male.

Types.—I have seen the series of 2 ♂ and 9 ♀ cotypes from various localities in New South Wales that is in MM and I have selected a male from Berowra as lectotype. There are paratypes in BM of *tripartitus* Kieffer (Suez Canal); of *pelostolum* Kieffer (Formosa); and of *pruinosum* Goetghebuer (Basra, Iraq). I have not seen type material of *pharao* Kieffer (Maadi, Egypt) nor of *ceylanicus* Kieffer (Colombo, Ceylon). In addition to these species that are certainly synonyms, *Polypedilum pavidus* (Hutton) from New Zealand is very similar, but having slight wing marking differences I have preferred to keep it separate for the present.

Additional specimens seen.—This is a common species in Australia, ranging from there to Formosa, Ceylon, and North Africa; new records outside Australia are: Tangier, Morocco, 1 ♀, and Esni, Morocco, 1 ♂, 3 ♀♀ (BM). *Australian records.*—QUEENSLAND: Townsville, 7 ♂♂, 16 ♀♀, and Watten, 3 ♂♂, 6 ♀♀, F. H. Taylor; Eidsvold, Aug. 1923, T. L. Bancroft, 3 ♀♀; Brisbane, A. J. Turner, 2 ♀♀ (SPHTM). NEW SOUTH WALES: Trangie, Mar. 1951, 4 ♂♂, 4 ♀♀ (SPHTM); Narrabeen, Oct.–Dec. 1956, W. W. Wirth, 2 ♀♀; Hornsby, D. J. Lee, 1 ♀; Badgery's Creek, Jan. 1960, D. J. Lee, numerous specimens. AUSTRALIAN CAPITAL TERRRITORY: Gungahlin, Jan. 1959, A. L. Dyce, 24 ♂♂, 14 ♀♀ (CSIRO); Black Mountain, I. F. B. Common, 1 ♀ (CSIRO). TASMANIA: Woodbury, Mar. 1957, 3 ♂♂, 3 ♀♀, W. Vestjens (CSIRO). SOUTH AUSTRALIA: Blackwood, N. B. Tindale, 3 ♀♀ (SAM); Adelaide, Apr. 1899, Ashley, 1 ♀ (NM); Ardrossan, H. M. Cane, 1 ♀ (CSIRO). WESTERN AUSTRALIA: Lake Monger, Mar. 1955, D. H. Edward, 5 ♂♂, 5 ♀♀; Esperance, Apr. 1958, D. H. Edward, 1 ♂, 1 ♀; Willgarup R., Apr.–May 1958, D. H. Edward, 4 ♂♂, 3 ♀♀; Millstream Station, July 1958, J. A. L. Watson, 4 ♀♀; Fremantle, K. R. Norris, 1 ♀ (CSIRO).

POLYPEDILUM (POLYPEDILUM) ? GRISEOGUTTATUM Kieffer

Polypedilum griseoguttatum Kieffer, 1921*c*, p. 100. Freeman, 1958, p. 284.

A small- to medium-sized species with strongly marked wings; thorax and abdomen with pruinosity, wing markings of variable intensity but include 3 dark markings of variable shape in cell R_5 and a spot basal to crossvein; hypopygium with 9th tergite drawn out, anal point more or less trifid.

A single female from New South Wales agrees exactly in wing markings (Fig. 23, *b*), general body colour, and leg pattern with this African species and the author does not wish to describe it as a new species until it is possible to examine a male.

Wing length.—2·5 mm.

Female.—Head, mouthparts, and antennae dark brown. *Thorax* dark brown, pruinose. *Legs* with all femora brown on basal three-quarters or more, apex yellow; front and posterior tibiae yellow, middle tibiae more or less brown; tarsi yellow, anterior basitarsi completely yellow, all other tarsal segments with basal quarter or more brown; L.R. 1·8, scale of anterior tibia triangular and with a short sharp spur. *Wing* (Fig. 23, *b*) with a complicated pattern, the important features being the presence of (*a*) 3 irregular spots in cell R_5, the basal one not in the base of the cell, and (*b*) a spot basal to the crossvein, in cell M_1. Halteres dark. *Abdomen* blackish, each segment pruinose on apical half, cerci yellowish.

Full details of synonymy, distribution in Africa and a figure of the male hypopygium are given in the author's account of the African Chironomidae (Freeman 1958).

Specimen seen.—The only Australian specimen known to the author is from Hornsby, N.S.W., Apr. 1956, D. J. Lee, 1 ♀.

Polypedilum (Polypedilum) watsoni, sp. nov.

A small dark species, wings with 4 spots, one placed near centre of cell R_5; legs unbanded; male hypopygium with long, narrow, anal point, broad curved appendage 1, and narrow styles. Very similar to the next species from which it differs in the wing shape and markings.

Wing length.—1·2–1·5 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. 1·2. *Thorax* brownish black and pruinose. *Legs* yellow, femora brown on basal three-quarters, L.R. 2, beard absent. *Wings* (Fig. 23, *c*) blunt-ended and each with 4 spots, one placed near the centre of cell R_5 and the one at its base smaller than in *tonnoiri*. Halteres with dark knobs. *Abdomen* blackish, hypopygium as in Figure 24, *b*; styles narrow, appendage 1 somewhat triangular and broad, anal point long and narrow, not bent downwards.

Female.—Resembles male.

Types.—Holotype ♂ and 6 ♂ and 8 ♀ paratypes from Millstream Station, W.A., 18–19.vii.1958, J. A. L. Watson. Further paratypes: WESTERN AUSTRALIA: Tambrey Station, Aug. 1958, J. A. L. Watson, 1 ♂, 1 ♀. AUSTRALIAN CAPITAL TERRITORY: Gungahlin, 17.i.1959, A. L. Dyce, 1 ♀ (CSIRO). NEW SOUTH WALES: Hornsby, Jan. 1958, D. J. Lee, 2 ♂♂, 9 ♀♀. Holotype and paratypes in WAM; paratypes in SPHTM, CSIRO, and BM.

Polypedilum (Polypedilum) tonnoiri, sp. nov.

This is another small species, extremely similar to *watsoni*, the hypopygia of the two being indistinguishable. Such differences as there are lie in the wings (Fig. 23, *d*) which are more pointed in the present species and lack the central spot in R_5; in addition the basal spot in this cell is larger. The size range appears to be rather larger, the wing length being 1·8–2·5 mm.

Types.—Holotype ♂ and paratype ♂ from Wilmot, Tas., 8.i.1923, A. L. Tonnoir. Further paratypes: TASMANIA: Hobart, Jan. 1923, A. L. Tonnoir, 2 ♂♂, 1 ♀. NEW SOUTH WALES: Hornsby, Feb. 1957, Nov. 1957, and Jan. 1958, D. J. Lee, 5 ♂♂, 5 ♀♀. WESTERN AUSTRALIA: Tambrey Station, July–Aug. 1958, J. A. L. Watson, 3 ♂♂. Holotype and paratypes in SPHTM, paratypes in WAM, USNM, and BM.

Polypedilum (Polypedilum) oresitrophus (Skuse), comb. nov.

Chironomus oresitrophus Skuse, 1889, p. 247. Kieffer, 1906, p. 21; 1917, p. 208.

Chironomus brevis Skuse, 1889, p. 249. Kieffer, 1906, p. 16; 1917, p. 208 (syn. nov.).

Wings unspotted, at most slightly smoky, vein R_5 strongly curved, *Cu* shorter than usual, *M* and *Cu* bare; knees brownish, abdomen with pruinose bands; appendage 1 of hypopygium with a curved finger-like apex.

Wing length.—1·5–2·0 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. about 0·6. *Thorax* brown and pruinose. *Legs* yellowish, knees, especially apices of femora, brown, tarsal beard absent, L.R. 1·3, anterior tibial scale oval and apparently unarmed. *Wings* almost clear, sometimes very slightly smoky, without spots; R_5 strongly curved (Fig. 23, *e*), M_1 bare, not curved upwards at tip, *Cu* short, only about half length of M_{3+4}, both veins bare. Halteres with dark knobs. *Abdomen* brown, each segment with a narrow apical pruinose band; hypopygium (Fig. 24, *c*) simple, appendage 1 broad basally and with a narrow, curved, finger-like apex.

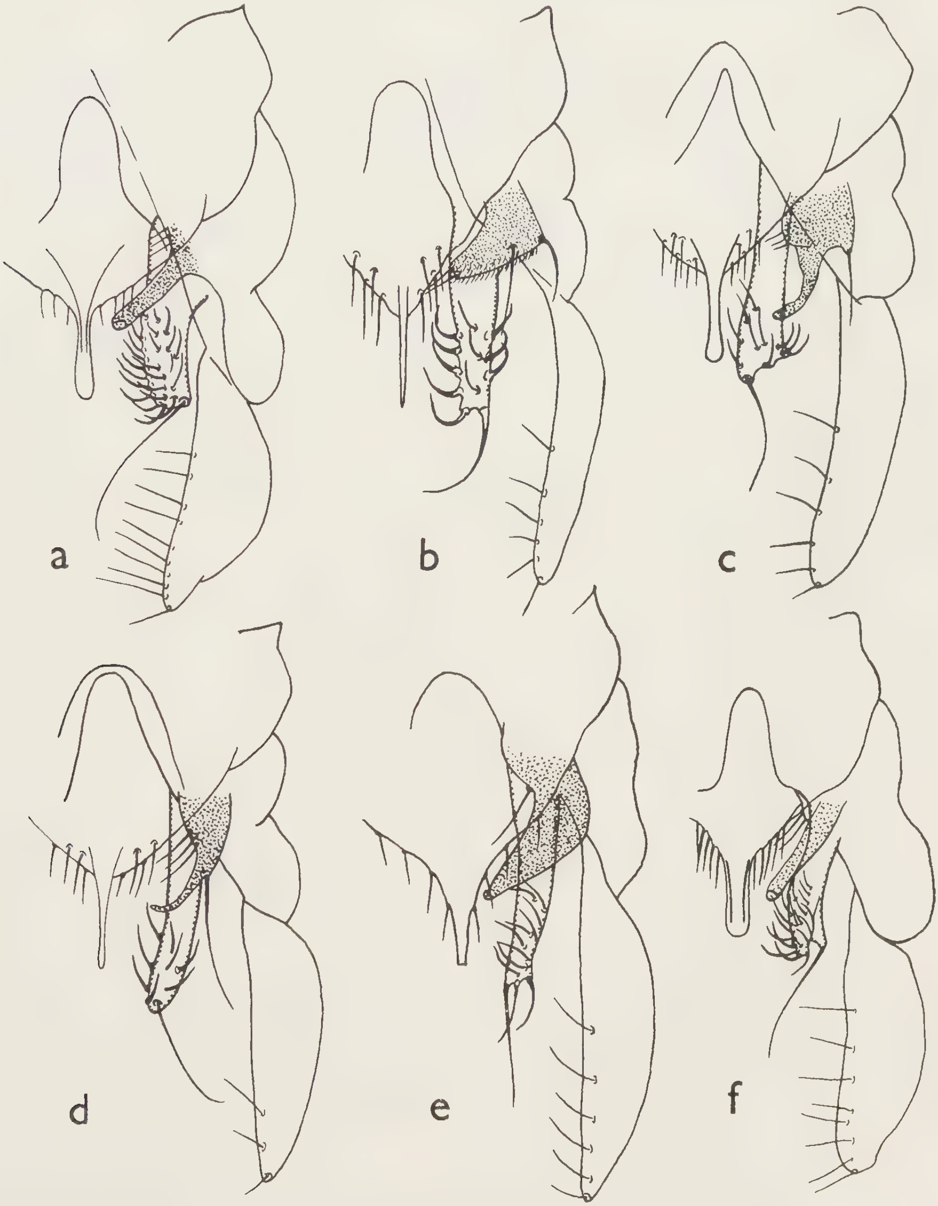

Fig. 24.—Male hypopygia of *Polypedilum*: *a, P.* (*Polypedilum*) *nubifer; b, P.* (*P.*) *watsoni; c, P.* (*P.*) *oresitrophus; d, P.* (*P.*) *seorsus; e, P.* (*P.*) *prasiogaster; f, P.* (*Pentapedilum*) *leei.*

Female.—Resembles male.

Types.—The cotype series of *oresitrophus* from Lawson, N.S.W., and the holotype female of *brevis* from Sydney, all of which are in the Macleay Museum, have been seen by the author, and the male specimen of *oresitrophus* has been chosen as lectotype.

Additional specimens seen.—NEW SOUTH WALES: Sydney, Jan. 1947, R. H. Wharton, 1 ♂ (SPHTM); Narrabeen, Sept.–Dec. 1956, W. W. Wirth, 4 ♂♂, 4 ♀♀; Careel Bay, Sept. 1956, W. W. Wirth, 1 ♂; and Sept.–Dec. 1957, D. J. Lee, 2 ♂♂.

POLYPEDILUM (POLYPEDILUM) WIRTHI, sp. nov.

A small dark species with unmarked wings and simple male hypopygium; separated from other species by the approximation of M_1 and R_5 and by the presence of macrotrichia on both branches of M and on Cu_1. In the wing characteristics it shows a resemblance to the New Zealand species *Paucispinigera approximata* Freeman and *Polypedilum opimus* Hutton, but it does not show the generic characters of the first nor the wing markings of the second.

Wing length.—1·3 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. 0·75. *Thorax* brown, slightly pruinose, shoulders pale. *Legs* yellowish, unmarked, L.R. 2, pulvilli rather short, tarsal beard absent. *Wings* (Fig. 23, *f*) clear and unmarked, R_5 and costa curved round apex of wing, M_1 curved forwards to meet them; both branches of M and apex of Cu bearing macrotrichia; halteres dark. *Abdomen* dark; hypopygium of simple type, similar to that of *seorsus* (Fig. 24, *d*), appendage 1 rather narrower, anal point slightly stouter.

Female.—Similar to male.

Types.—Holotype ♂ and 2 ♂ and 2 ♀ paratypes from Middle Creek, Narrabeen, N.S.W., 16.ix.1956, W. W. Wirth. Holotype and two paratypes returned to USNM, two paratypes retained in BM.

POLYPEDILUM (POLYPEDILUM) SEORSUS (Skuse), comb. nov.

Chironomus seorsus Skuse, 1889, p. 241. Kieffer, 1906, p. 22; 1917, p. 206.

Chironomus orarius Skuse, 1889, p. 242. Kieffer, 1906, p. 21 (syn. nov.).

A small pale species with unmarked wings and legs and with simple male hypopygium; veins M and Cu bare, R_5 curved, halteres pale.

Wing length.—1·8–2·0 mm.

Male.—*Head*, mouthparts, and antennae yellowish, A.R. 1·2. *Thorax* yellowish, stripes slightly reddish. *Legs* pale and quite unmarked, L.R. 2, tarsi not bearded. *Wings* with simple venation, R_5 and costa curved, M_{1+2} not curved, bare, both branches of posterior fork bare; halteres pale. *Abdomen* yellowish green, hypopygium of simple type (Fig. 24, *d*).

Female.—Resembles male.

Types.—The holotype female of *seorsus* from Lawson, N.S.W., and the cotype series of *orarius* from Sydney and Berowra, N.S.W., are all in the Macleay Museum. Skuse mentions the similarity of the two species, but he thought they were different, probably being misled by the single female in the *orarius* series which happens to be a species of *Stenochironomus*. The author can see no reason for maintaining the separation; a male from Middle Harbour, Sydney, has been selected as lectotype of *orarius*.

Additional specimens seen.—NEW SOUTH WALES: Narrabeen, Oct. 1956, W. W. Wirth, 1 ♂; Mosman, Mar. 1957, W. W. Wirth, 2 ♂♂; Hornsby, Jan. 1958, D. J. Lee, 3 ♂♂, 5 ♀♀.

POLYPEDILUM (POLYPEDILUM) VESPERTINUS (Skuse), comb. nov.

Chironomus vespertinus Skuse, 1889, p. 248. Kieffer, 1906, p. 22; 1917, p. 208.

Orthocladius venustulus Skuse, 1889, p. 257. Kieffer, 1906, p. 28; 1917, p. 228 (syn. nov.).

A small dark species, wings unmarked, legs plain and hypopygium simple; posterior wing veins bare, venation simple. Very similar to other species with plain wings and simple hypopygium but the darker and pruinose thorax suggests that it is a separate species.

Wing length.—1·5–1·8 mm.

Male.—*Head* brown, mouthparts and antennae yellowish brown, A.R. 0·9. *Thorax* dark brown and with well-developed pruinosity. *Legs* pale yellow, unmarked, tarsal beard absent, L.R. 2. *Wings* plain, unmarked, venation very similar to *wirthi* (Fig. 23, *f*) except that vein M_{1+2} does not curve forwards, *M* and *Cu* both bare; halteres with dark knobs. *Abdomen* blackish brown, hypopygium of simple type, very similar to that of *seorsus* (Fig. 24, *d*).

Female.—Not known.

Types.—Cotype series of males of *vespertinus* from National Park, near Sydney, in Macleay Museum; the author has selected one as lectotype. Holotype male of *venustulus* from Berowra, N.S.W., in same museum, presumably placed in wrong genus because legs crossed so that middle leg appears to be the front leg and thus gives an L.R. of less than 1: there is no reason for it to be considered distinct from *vespertinus.*

Additional specimen seen.—Narooma, N.S.W., Nov. 1930, A. L. Tonnoir, 1 ♂ (CSIRO).

POLYPEDILUM (POLYPEDILUM) PRASIOGASTER, sp. nov.

Thorax mainly dark brown and pruinose, abdomen grass green, wings unmarked, legs dark on anterior and middle femora and bases of tibiae, appendage 1 of hypopygium broad.

Wing length.—2·5 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. 1·6 *Thorax* mainly dark and with changeable pruinosity, but mesonotum paler brown centrally. *Legs* greenish yellow, anterior and middle femora brown except for basal quarter, tibiae of these legs brown on basalf half or third; no tarsal beard, scale with short black spur, L.R. 1·75. *Wings* clear and unmarked, halteres with black knobs, venation simple, posterior veins bare. *Abdomen* clear grass green without darker markings, body contents cause posterior segments to appear darker; hypopygium (Fig. 24, *e*) of simple type but with massive appendage 1 and stout anal point.

Female.—Resembles male.

Types.—Holotype ♂ from Oxford Falls, near Sydney, Sept. 1956, W. W. Wirth, in USNM. Paratypes: AUSTRALIAN CAPITAL TERRITORY: Blundell's, Jan. 1930, A. L. Tonnoir, 1 ♂, returned to CSIRO; Cotter R., Mar. 1930, A. L. Tonnoir, 1 ♀, retained in BM.

POLYPEDILUM (PENTAPEDILUM) LEEI, sp. nov.

Blackish species with strong pruinose markings at apices of abdominal segments, legs paler, knees brown; wings with dark macrotrichia over entire surface; male hypopygium simple.

Wing length.—2–2·5 mm.

Male.—*Head*, mouthparts, and antennae blackish or dark brown, A.R. about 2. *Thorax* black, hair lines pruinose, dorsocentrals biserial, bristles blackish. *Legs* pale brown, slightly darkened at the knees; anterior tibia about three-quarters length of femur, scale oval and with very short spur, L.R. 1·8. *Wings* without markings, clothed evenly all over with dark macrotrichia, halteres with dark knobs. *Abdomen* black, each segment slightly paler at apex where there is a strong pruinose band, emarginate centrally; hairs blackish. Hypopygium (Fig. 24, *f*) of simple type very similar to *P.* (*Polypedilum*) *nubifer.*

Female.—Resembles male.

Types.—Holotype ♂ and 10 ♀ paratypes from Hornsby, N.S.W., Jan. 1958, D. J. Lee. Further paratypes: QUEENSLAND: Townsville, F. H. Taylor, 4 ♀♀. NEW SOUTH WALES: Hornsby, D. J. Lee, Apr. 1956, 4 ♀♀, and Nov. 1957, 2 ♀♀; Narrabeen, Oct. 1956, W. W. Wirth, 1 ♀; Sydney, Jan. 1960, D. J. Lee, 6 ♂♂. SOUTH AUSTRALIA: Adelaide, May 1909, R. A. Zietz, 1 ♀ (SAM). WESTERN AUSTRALIA: Esperance, Apr. 1958, D. H. Edward, 1 ♂, 3 ♀♀. Holotype returned to SPHTM, paratypes in BM, USNM, SPHTM, and SAM

Genus STICTOCHIRONOMUS Kieffer

Stictochironomus Kieffer, 1919, p. 44. Freeman, 1958, p. 304.*

Type species *Chironomus pictulus* Meigen, 1830.

Antennae of male with 14 segments, of female with 6, frontal tubercles absent. Pronotum rather more reduced than in *Polypedilum*, mesonotum often with a small central tubercle or slight hump; dorsocentrals uniserial, acrostichals usually present but small. Anterior tibia with an oval unarmed scale, combs of other tibiae fused and with a single spur on each pair, pulvilli not split, present but small. Wing membrane bare, except in one Australian species which has a few macrotrichia near the apex in the male and more numerous in the female; R_{2+3} distinct and ending well beyond tip of R_1; squama with complete fringe. Eighth abdominal segment of male without triangular basal appearance seen in *Polypedilum*.

The two Australian species placed here resemble the African species *S. puripennis* (Kieffer) rather than the type species of the genus, but the resemblances seem sufficient for their retention in the genus, at any rate for the present. They can readily be separated from each other because *illawarra* has larger pulvilli and macrotrichia on the wing membrane, the latter being quite absent in *fluviaticus*. The author does not consider this to be a generic character because of their great similarity in other respects and the variability of this character elsewhere in the family.

STICTOCHIRONOMUS FLUVIATICUS (Skuse), comb. nov.

Chironomus fluviaticus Skuse, 1889, p. 245. Kieffer, 1906, p. 18; 1917, p. 208.

Brown or dark brown species, abdomen blackish with pruinosity at incisures, legs dark at knees, wings bare and unmarked, male styles rather expanded at apices.

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* For fuller synonymy and further information on the genus see Freeman (1958).

Wing length.—1·8–2·5 mm.

Male.—*Head*, mouthparts, and antennae dark brown, A.R. 2. *Thorax* brown, stripes darker and more or less separate, mesonotum pruinose, especially between stripes and in prescutellar region, acrostichal bristles present as complete double row. *Legs* pale brown or yellowish, darkened at the knees, beard absent, L.R. 1·3, pulvilli very small. *Wings* unmarked, vein R_{4+5} more or less straight, halteres white. *Abdomen* black, pruinose at the incisures; hypopygium (Fig. 25, *a*) very

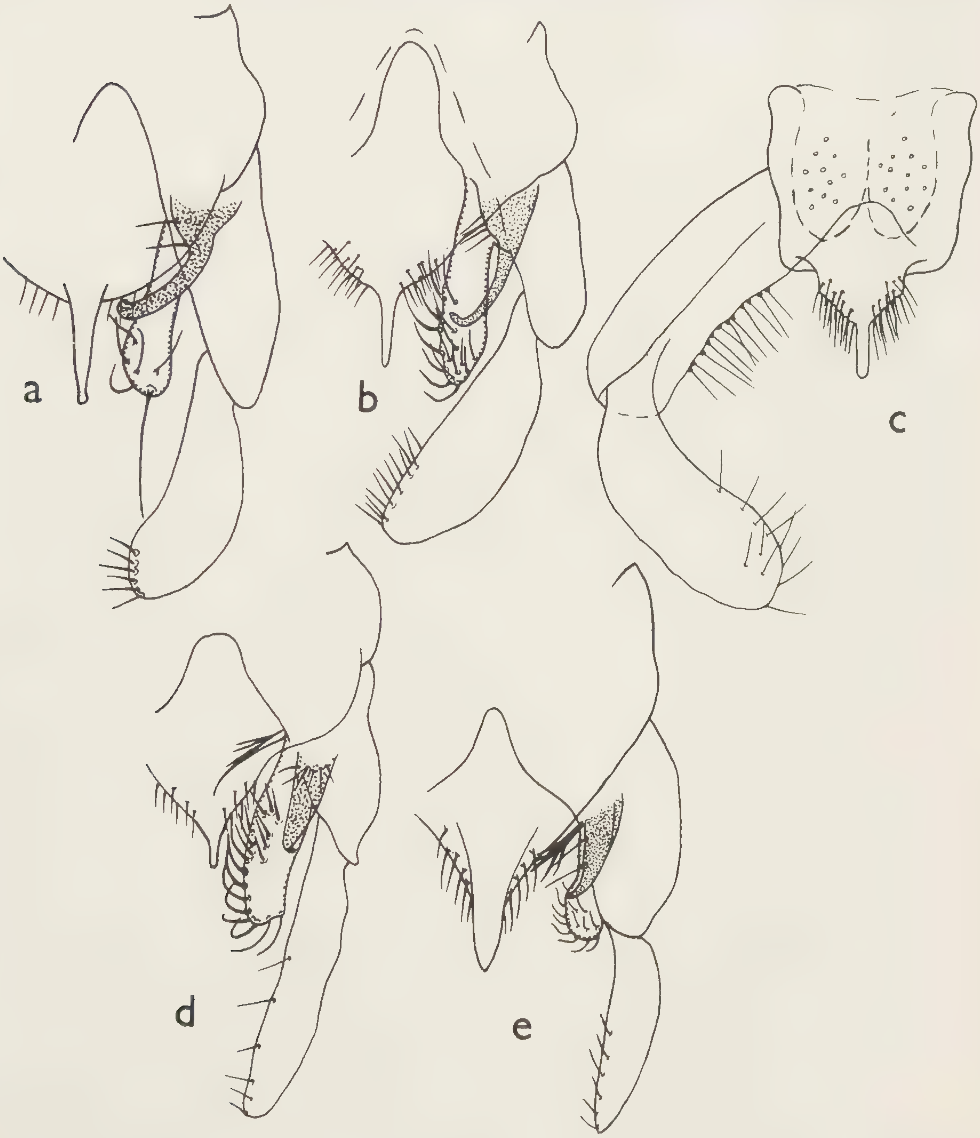

Fig. 25.—Male hypopygia of: *a, Stictochironomus fluviaticus; b, S. illawarra; c, Parvitergum tonnoiri; d, Paraborniella tonnoiri; e, Skusella subvittatus.*

similar to that of *S. puripennis* Kieffer (from Africa south of Sahara), styles broad at apex, appendage 1 simple.

Female.—Resembles male.

Types.—Cotypes in Macleay Museum from which a male has been selected by the author as lectotype; type locality Nepean R., N.S.W.

Additional specimens seen.—QUEENSLAND: Mossman, F. H. Taylor, 1 ♀; Mt. Molloy, F. H. Taylor, 3 ♂♂, 3 ♀♀. NEW SOUTH WALES: Sydney, F. H. Taylor, 1 ♂, 2 ♀♀.

STICTOCHIRONOMUS ILLAWARRA, sp. nov.

A brown species without pruinose bands on abdomen, legs pale, wings with some inconspicuous macrotrichia in apical half in male and more generally distributed in female, pulvilli conspicuous.

Wing length.—2·0 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. about 0·75. *Thorax* brown and slightly pruinose, shoulders and scutellum paler, dorsocentrals uniserial, acrostichals present as complete double row, bristles pale. *Legs* yellowish, anterior tibia and femur subequal, scale oval and unarmed, L.R. 1·25, beard absent; tibial spur on mid and hind tibiae short, curved, and not conspicuous (some males have an incipient 2nd spur on some legs), pulvilli conspicuous. *Wings* with some macrotrichia which are pale, inconspicuous and confined to apex, halteres pale. *Abdomen* dark brown, without definite markings, hairs pale; hypopygium (Fig. 25, *b*) of simple type, styles more or less oval.

Female.—Similar to male in colour, dorsocentrals more or less biserial wing macrotrichia much more conspicuous and numerous, spreading basally and extending over most of anal cell.

Types.—Holotype ♂ and 9 ♂ and 4 ♀ paratypes from Lake Illawarra, N.S.W., Jan. 1948, R. H. Wharton. Further paratypes: Balnarring, Vic., Apr. 1929, F. E. Wilson, 1 ♂, 1 ♀. Holotype returned to SPHTM, paratypes in BM, SPHTM, and NM.

Genus PARVITERGUM, gen. nov.

Type and only known species *Parvitergum fuscipenne*, sp. nov.

Palpi fully developed, male antennae with 14 segments, fully plumed, female not known, eyes with well-developed dorsal narrow portion. Prothorax well formed but mesonotum rather bulbous and projecting beyond it, acrostichal bristles in a strong double row. Anterior femur slightly clavate, tibia equal to it, scale with strong thorn-like spur, L.R. 1·25; combs of other tibiae fused and with single spur only, pulvilli present and simple. Veins R_1 and R_{2+3} separate at apex, the latter ending at about one-third of distance between R_1 and R_{4+5}, posterior fork slightly distal to crossvein, squama with complete fringe. Eighth abdominal segment of male not triangularly constricted basally, 9th segment small and quadrate with long anal point, claspers large in comparison with tergite, coxites narrow, styles with some degree of mobility but probably not as much as in Orthocladiinae, appendages 1 and 2 both absent (Fig. 25, *c*).

The male claspers appear at first sight to resemble those of an orthocladiine genus, but the tibial combs and front basitarsus are distinctly chironomine. It is not clear to which genus it is related, although superficially it resembles *Polypedilum*, from which it may be distinguished by the simple unsplit pulvilli; the coxites and styles show greater similarity to *Stictochironomus* or *Allochironomus* species, but the presence of front tibial spur and the complete absence of coxite appendages renders it distinct.

PARVITERGUM FUSCIPENNE, sp. nov.

A dark species, outer half of wing clouded, legs patterned with brown and white abdomen practically unicolorous, easily recognized by the distinctive hypopygium.

Wing length.—3·6 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. about 2, frontal tubercles absent. *Thorax* dark brown and slightly pruinose, hair lines and shoulders yellowish. *Legs*: basal two-thirds of femora pale, apex dark brown, basal and apical thirds of tibiae dark, central part whitish, tarsi whitish, segments dark at apices, L.R. 1·4, slight beard present. *Wings* with outer half clouded, the clouding spreading along costal cell to base and into anal cell where it expands to form a central spot. *Abdomen* dark brown, each segment vaguely paler towards apex; hypopygium (Fig. 25, *c*) without coxite appendages, anal point curved downwards, claspers narrow and pincer-like.

Type.—Holotype ♂ from Beaconsfield, Vic., Dec. 1923, G. F. Hill, returned to NM.

Genus PARABORNIELLA, gen. nov.

Type and only known species *Paraborniella tonnoiri*, sp. nov.

Male antenna with 14 segments, female not known, frontal tubercles absent, palpi well developed. Prothorax reaching nearly to front of mesonotum, slightly bilobed, acrostichal bristles well developed. Tibial combs narrowly separated, single spur present, the larger inner comb of hind tibia unarmed; pulvilli completely absent; anterior tibial scale unarmed and scarcely developed. Squama with reduced fringe consisting of 2–5 spaced hairs in some specimens, wing membrane lacking macrotrichia; R_{2+3} ending in costa at about one-third of the distance between R_1 and R_{4+5}, posterior fork well beyond crossvein. Eighth abdominal segment not contracted basally, hypopygium with well formed anal point, appendage 2*a* present.

This genus shows characters of both *Paratendipes* Kieffer and *Lauterborniella* Bause, but it is separated by the different association of these characters; it also resembles *Stictochironomus* from which it is separated by the unfused tibial combs, absence of pulvilli and presence of appendage 2*a*. The important features are the absence of pulvilli and anterior tibial spur combined with the single posterior tibial spur, presence of squamal fringe and appendage 2*a*. It is separated from *Skusella*, gen. nov., by the absence of pulvilli, separation of hind tibial combs, and presence of acrostichal bristles.

PARABORNIELLA TONNOIRI, sp. nov.

Wing length.—2·5 mm.

Male.—General body colour dark brown or blackish, thorax pruinose, legs brown and without definite markings, wings unmarked. A.R. nearly 2, L.R. 1·5, tarsal beard absent; hypopygium (Fig. 25, *d*) with rather elongate styles, appendage 1 broad and hooked downwards, 2 fairly long and with strong bristles, 2*a* short and with pencil of few long hairs, anal point bare and narrow.

Female.—Not known.

Types.—Holotype ♂ and 1 ♂ paratype from Canberra, 7.xi.1929, A. L. Tonnoir; further paratype: Euroa, Vic., Aug. 1959, N. Dobrotworsky, 1 ♂ (BM). Holotype returned to CSIRO.

Genus SKUSELLA, gen. nov.

? *Kribiomyia* Kieffer, 1921*a*, p. 271. Freeman, 1958, p. 328.

Lauterborniella Freeman, 1958, p. 319 (in part; not Bause, 1914).

Type species *Chironomus subvittatus* Skuse, 1889.

Male antenna with 14 segments, female with 6, frontal tubercles absent. Pronotum reaching more or less to front of mesonotum but narrow and inconspicuous, acrostichal bristles absent so far as can be seen. Anterior tibia with oval scale lacking spur or spine; tibial combs of other legs fused, each pair with a single, fairly long, curved spur, pulvilli present and not divided. Wings with R_{2+3} ending beyond R_1, squamal fringe either absent or greatly reduced. Eighth segment of male not constricted basally, appendage 2*a* present, 2 short and rounded.

At first sight, this genus is very similar to *Lauterborniella*, but the absence of anterior tibial spur and presence of appendage 2*a* combined with the presence of a reduced squamal fringe in the type species suggests a different genus. The African species *Kribiomimus pallidipes* Kieffer placed by the present author in *Lauterborniella* in 1958, also belongs here and is structurally very similar, although the thoracic and wing patterns are quite different and the squama is quite bare.

Kieffer described the genus *Kribiomyia* from a female with rounded tibial scale and, although the description is not sufficient for definite identification, there is a possibility that this is an earlier name for this genus.

SKUSELLA SUBVITTATA (Skuse), comb. nov.

Chironomus subvittatus Skuse, 1889, p. 246. Kieffer, 1906, p. 22; 1917, p. 208.

Thorax rather shining, brownish, pruinose on pleura, legs yellow, anterior femora brownish at apices, wings unmarked, squama with a few hairs, abdomen black, hypopygium as in Figure 25, *e*.

Wing length.—2·2 mm.

Male.—*Head*, mouthparts, and pedicel brown, flagellum more yellowish, A.R. about 1·5. *Thorax* rather shining, mostly brown, although mesonotal background colour yellowish, separating stripes; pleura pruinose. *Legs* yellow, anterior femora brown at apices, L.R. 1·9, tarsi not bearded. *Wings* quite unmarked, R_{2+3} ending at one-third of distance between R_1 and R_{4+5}, the latter more or less straight and ending short of wing tip, posterior fork at same level as crossvein; squama of only known specimen with 2 hairs; halteres yellow. *Abdomen* dark brown, hypopygium (Fig. 25, *e*) similar to that of *pallidipes*; styles narrow, coxites well formed, appendage 1 beak-like, appendage 2 rounded and short, 2*a* with a few stiff branches or bristles, anal point stout.

Type.—Holotype ♂ and only known specimen from Walcha, N.S.W., in MM.

Genus LAUTERBORNIELLA Bause

Lauterborniella Bause, 1914, p. 120. Townes, 1945, p. 19. Freeman, 1958, p. 319.

Type species *Tanytarsus agrayloides* Kieffer, 1911.

Male antenna with 13 or 14 segments, the last 2 often indistinctly separated, female with 6–7 segments; frontal tubercles absent. Pronotum reduced and not visible from above, acrostichal bristles in a strong double row. Anterior tibia usually with a short sharp spur or triangular pointed scale; combs of posterior tibiae separate, the smaller with a spur; pulvilli well developed. Vein R_{2+3} ending beyond tip of R_1, squama bare. Eighth segment of male abdomen not triangularly constricted basally, hypopygium with 2 pairs of coxite appendages.

LAUTERBORNIELLA FUSCOGUTTATA (Kieffer)

Polypedilum fuscoguttatum Kieffer, 1922, p. 37.
Lauterborniella fuscoguttata Freeman, 1958, p. 320.

There is a single female in the collection of the USNM which is inseparable from this striking African species. The wing is heavily patterned (see photograph in Freeman (1958)) especially noteworthy being the 3 dark spots in the posterior fork cell. The anterior femora are clubbed, the club being black; the tarsi are white, each segment with a black apex; the small comb of the posterior tibia projects beyond the other and is twisted; the abdomen is black, each segment carrying an oval longitudinal ridge in its basal half and a silvery pruinose patch on its apical half.

As stated in the abovementioned paper, it is difficult to distinguish this species from European material of *L. marmorata* van der Wulp (apparently a parthenogenetic species) and it also strongly resembles *L. varipennis* Coquillett from North America. However, Roback (1957, p. 107) suggests that the North American species may differ from the European because it has a 4-branched and not 2-branched pupal respiratory organ.

Australian specimen seen.—Narrabeen, N.S.W., Oct. 1956, W. W. Wirth, 1 ♀.

Genus MICROTENDIPES Kieffer

Microtendipes Kieffer, 1915, p. 70. Townes, 1945, p. 22. Freeman, 1958, p. 310.

Type species *Tendipes abbreviatus* Kieffer (= *chloris* Meigen).

Antennae of male with 14 segments, of female with 6 or 7; frontal tubercles absent. Pronotum reduced, divided in the middle and overhung by mesonotum; mesonotum without central tubercle; dorsocentral bristles present as a clear row, but acrostichals reduced to a group at the apex of the mesonotal cone. Anterior tibia more or less truncate at apex, scale not produced at all and unarmed; combs of other tibiae separated, one spur on each pair; pulvilli present but often small, not divided longitudinally; anterior femur of male often with a tuft of bristles near the apex pointing towards the base. Wing membrane without macrotrichia, with or without dark markings; squama with complete fringe; R_{2+3} lying very close to R_1 apically and often almost indistingushable from it at the tip. Eighth abdominal tergite of male not constricted basally, 2 coxite appendages present, appendage 2 without long apical hair.

Further information and synonymy is given in Freeman (1958); a single species is known to the author from Australia and New Guinea, apparently indistinguishable from a not uncommon African species.

MICROTENDIPES UMBROSUS Freeman

Microtendipes umbrosus Freeman, 1955*b*, p. 32; 1958, p. 313.

Yellowish brown species with darker markings on thorax; knees dark, anterior femur with additional dark ring; wings with median transverse dark band; abdomen pale on segments 1–5 or pale with narrow dark rings.

Wing length.—2·5–3·75 mm.

Male.—*Head* yellowish, mouthparts darker, pedicel reddish, plumes paler towards apex, A.R. 2·3. *Thorax* with pale shoulders and brown stripes; the lateral ones usually darker; stripes usually more or less fused, postnotum and sternopleuron dark brown. *Legs* yellowish white, all knees and apices of tibiae dark, especially on anterior legs; anterior femur with broad dark ring distal to middle, other femora with traces of similar ring; anterior tarsal segments dark at etxreme apices, femur with patch of setae directed basally; L.R. 1·2. *Wings* with central dark shade or band, hardly extending basal to posterior fork, but sometimes extending towards apex; halteres pale. *Abdomen* usually with segments 1–5 yellowish white, but occasionally segments have dark rings at apices; hypopygium not unlike other species of the genus.

Female.—Essentially similar to male but dark markings more extensive and distinct, abdomen not always distinctly paler basally.

Distribution.—Widely distributed in Africa. Australian specimens seen: NEW GUINEA: Port Moresby, May–June 1947, 2 ♂♂; Sogeri, June 1947, 1 ♀; Ilolo, June 1947, 1 ♀ (all coll. D. J. Lee and R. H. Wharton). QUEENSLAND: Innisfail, E. G. Fahey, 2 ♀♀ (SPHTM); Berner Creek, E. G. Fahey, 1 ♀ (SPHTM).

Genus LUNDSTROEMIA Kieffer

Lundstroemia Kieffer, 1921*d*, p. 36. Goetghebuer, 1938, p. 98.

Type species *Lundstroemia roseiventris* Kieffer.

A *Tanytarsus*-like genus with macrotrichia on the wing membrane and radial sector continuing the line of *r-m*, the eyes are bare. Its main points of separation lie in the fusion ventrally of the combs of the 4 posterior tibiae, the fused pair bearing 1 or 2 short spurs (in *Micropsectra*, a genus not known so far from Australia, they are unarmed); there are 3 or 4 pairs of coxite appendages.

A single parthenogenetic species is known to the author from Australia.

LUNDSTROEMIA PARTHENOGENETICA, sp. nov.

This species is known only from the females and has been bred through several generations in the laboratory by Mr. D. H. Edward without males appearing. It is the only known Australian species and may be distinguished from Palaearctic species by possessing the combination of 2 spurs on each posterior tibia, frontal tubercles, and small pulvilli.

Wing length.—2·0–2·5 mm.

Female.—*Head* greenish, small frontal tubercles present, antennae 6-segmented, each of segments 3–5 spindle-shaped. *Thorax* green; stripes, postnotum, and sternopleuron brown. *Legs* pale greenish, L.R. about 1·3, small pulvilli present, posterior tibial combs fused, occupying more than half of circumference, and each fused pair with 2 spurs. *Wings* clothed all over with macrotrichia, halteres greenish. *Abdomen* yellowish green.

Types.—Holotype ♀ and 12 ♀ paratypes from Lake Gwellup, W.A.; holotype and 8 ♀♀, Aug. 1958, and 4 ♀♀ of fifth generation, Nov. 1958, D. H. Edward. Holotype and two paratypes returned to WAM, remainder in BM.

Genus TANYTARSUS van der Wulp

Tanytarsus van der Wulp, 1874, p. 134. Goetghebuer, 1938, p. 105. Freeman, 1958, p. 331.

Male antenna with 13 or 14 segments, female with 5–7. Wing membrane with a variable number of macrotrichia, squama bare, crossvein parallel to and practically continuous with R_{4+5}, anal area usually more or less developed. Scutellum with several long marginal bristles, although the central pair may be the longest in the smaller species. Combs of posterior tibiae at least narrowly separated ventrally, occupying at most half circumference of tibia, usually both combs with a spur, but inner one often the shorter and occasionally absent. Male hypopygium with 1 or 2 pairs of coxite appendages in addition to the normal 2.

The correct name for this genus and its type species is at the moment being decided by the International Commission for Zoological Nomenclature and for further information reference should be made to Freeman (1958) and to the *Bulletin of Zoological Nomenclature* **17**: 241–3 (1960), where the case is fully set out.

Out of the subgenera of *Tanytarsus* recognized by the author in 1958 only *Tanytarsus*, s.s., and *Cladotanytarsus* are known from Australia, eight species in the first and two in the second being described below. Skuse described seven species in 1889, two being referable to *Harrisius* and one probably to *Stempellina*. Of the remaining four, two are recognizable because males are present in the type series, but the last two (*communis* and *ogilbyi*) were based on females only and it is not possible to offer fuller descriptions than Skuse gave, or to associate them with more recently captured material.

Key to Australian Species of the Genus Tanytarsus[*]

1. Appendage 2*a* of male hypopygium with simple hairs at apex (species of this group from Australia all fall into subgenus *Tanytarsus* s.s.) 2
   Appendage 2*a* with long branched or forked hairs at apex (subgenus *Cladotanytarsus*) 9
2. Tibial combs greatly reduced and almost absent, male tarsi bearded ... *barbitarsis*, sp. nov.
   Tibial combs well formed, tarsi not bearded in known species 3
3. Anal point with dots in a well-formed single row (Fig. 26, *b*, *c*) 4
   When dots are present, then not in a single row 5
4. Anal point with coarse dots (Fig. 26, *b*) .... *fuscithorax* Skuse
   Anal point with fine dots (Fig. 26, *c*) .... *inextentus* Skuse
5. Anal point broad and truncate (Fig. 27, *c*), wings cuneiform ...... *belmorensis*, sp. nov.
   Anal point normal in appearance 6
6. Appendage 2 long with 4–6 long flattened spines at apex 7
   Appendage 2 not of this form 8
7. Anal point shorter, spines at apex of 9th tergite simple, appendage 1 subovoid (Fig. 27, *a*) .... *spinosus*, sp. nov.
   Anal point longer, spines trifid, appendage 1 with apical half inflated (Fig. 27, *b*) .... *palmatus*, sp. nov.
8. Appendage 2*a* large and with flattened hairs, forming a fan, anal point blunt (Fig. 27, *d*), abdomen of male with dark rings .... *bispinosus*, sp. nov.
   Appendage 2*a* smaller, bent at right angles and with an apical hair brush (Fig. 27, *e*), abdomen plain green .... *sydneyensis* Kieffer
9. Anal point well formed, appendage 2*a* large, appendage 1 small (Fig. 28, *b*) .... ? *mancus* (Walker)
   Anal point virtually absent, its position occupied by 4 bristles, appendage 2*a* small, appendage 1 bulky (Fig. 28, *a*) .... *furcatus*, sp. nov.

TANYTARSUS (TANYTARSUS) BARBITARSIS, sp. nov.

Blackish species, thorax with some pruinosity, anterior tarsi of male with long beard, male with macrotrichia at wing apex only, tibial combs greatly reduced and almost absent, spurs short as well. The virtual absence of tibial combs suggests that this species might be better placed in a new genus, but its other characters, such as hypopygial structure are similar to other species of *Tanytarsus* and so it is being left here for the present.

Wing length.—2–2·5 mm.

Male.—*Head*, mouthparts, and antennae brown, pedicel black, A.R. 1·4, frontal tubercles absent. *Thorax* blackish with some grey pruinosity, shoulders and scutellum paler. *Legs* brown, L.R. 1·8, anterior tarsi with long beard, pulvilli absent, spurs of other legs rather short, slightly enlarged basally, but typical combs greatly reduced and virtually absent. *Wings* with fine macrotrichia at apex only, costa ending beyond level of apex of M_{1+2}, squama bare; halteres pale. *Abdomen* uniformly blackish; hypopygium (Fig. 26, *a*) with short stout anal point, central area marked off and with a few dots but not as a row; remainder of hypopygium very similar to *fuscithorax*, appendage 1 rather narrower, 1*a* absent, 2*a* shorter but with a similar vertical fan of simple hairs.

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[*] Based mainly on male characters.

Female.—Resembles males in essential features, macrotrichia more numerous on wings, thorax often paler.

Types.—Holotype ♂ and 5 ♂ and 2 ♀ paratypes from Bremer Bay, W.A., 5.iv.1958, D. H. Edward. Further paratypes: WESTERN AUSTRALIA: Rottnest I., 22.iii.1958, 5 ♂♂, 5 ♀♀; Dalyup R., larvae coll. 2.iv.1958, emerged Apr.–May 1958, 6 ♂♂, 6 ♀♀; Esperance, Apr. 1958, 2 ♀♀; Lake Grace, Mar.–Apr. 1958, 2 ♂♂, 3 ♀♀ (all coll. D. H. Edward); Mill Stream Station, 18.vii.1958, 15 ♀♀, and Tambrey Station, 27.vii.1958, J. A. L. Watson, 1 ♂. Fifteen paratypes retained in BM, holotype and remainder of series returned to WAM.

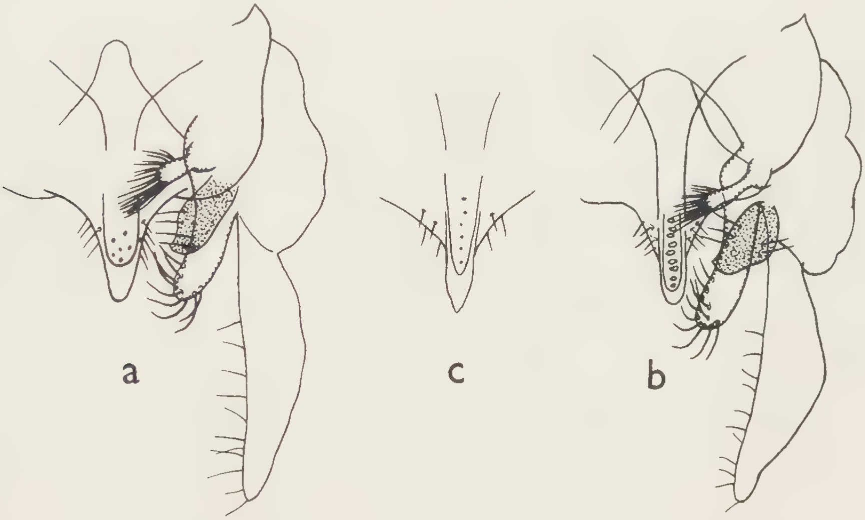

Fig. 26.—Male hypopygium of *Tanytarsus* (*Tanytarsus*): *a*, *T. barbitarsis*; *b*, *T. fuscithorax*; *c*, *T. inextentus*, anal point only.

TANYTARSUS (TANYTARSUS) FUSCITHORAX Skuse

Tanytarsus fuscithorax Skuse, 1889, p. 272. Kieffer, 1906, p. 30; 1917, p. 224.

Thoracic markings reddish or brownish, background paler, abdomen greenish, anterior tarsi of male without beard, wings with macrotrichia over most of surface, anal point with row of coarse dots.

This species is very similar to *inextentus*, differing mainly in the smaller size and the coarser dots on the anal point; both resemble *funebris* Freeman from New Zealand, but here again the anal point and dots are different.

Wing length.—1·7–1·9 mm.

Male.—*Head*, mouthparts, and antennae brown, A.R. about 1·0, frontal tubercles well developed. *Thorax* yellowish with brown stripes, postnotum, and sternopleuron. *Legs* yellowish brown, pulvilli absent, L.R. 2·5, beard absent, combs of mid and posterior tibiae normal in development, occupying half the circumference, clearly separated, each with a spur. *Wings* with macrotrichia over most of the surface, although less numerous basally, apex of costa beyond level of apex of M_{1+2}; halteres pale. *Abdomen* dark or paler green; hypopygium (Fig.

26, *b*) with short anal point rounded at apex and carrying a row of extremely coarse dots, appendage 2*a* with vertical fan of simple hairs, 1*a* absent.

Female.—Similar to male in general structure and colour.

Type.–Holotype ♂ from Narrabeen Lagoon, near Manly, N.S.W., is in MM (seen by author).

Additional specimens seen.—QUEENSLAND: Townsville, F. H. Taylor, 18 ♂♂. NEW SOUTH WALES: Warriewood, Oct. 1956, W. W. Wirth, 12 ♂♂, 3 ♀♀; Mosman, Mar. 1957, W. W. Wirth, 18 ♂♂; Hornsby, Jan. 1958, numerous specimens, D. J. Lee. WESTERN AUSTRALIA: Lake Monger, Oct. 1956, D. H. Edward, 4 ♂♂, 5 ♀♀; Lake Grace, Mar. 1958, Wilgarup R., Franklin R., Dalyup R., Esperance, Apr. 1958, Muchea, June 1958, D. H. Edward, 23 ♂♂, 12 ♀♀.

TANYTARSUS (TANYTARSUS) INEXTENTUS Skuse

Tanytarsus inextentus Skuse, 1889, p. 269. Kieffer, 1906, p. 30; 1917, p. 224.

In general structural features, colour, and hypopygium this species is similar to *fuscithorax*. However, the size is considerably greater, the wing length being 2·3–2·75 mm, the anal point of the male is pointed, and its row of dots not only much finer but also set further back from the apex (Fig. 26, *c*). I am treating it as a separate species until more material is available, which may show that it is only a variety.

Types.—I have seen the types series of 3 ♂ and 3 ♀ cotypes from Sydney which is in MM, and I have selected one male as lectotype.

Additional material seen.—TASMANIA: Advent Bay, Jan. 1922, 2 ♂♂, and L. Margaret, Feb. 1923, 3 ♂♂, 1 ♀, A. L. Tonnoir. VICTORIA: Hamilton, May 1930, F. E. Wilson, 1 ♂.

TANYTARSUS (TANYTARSUS) BELMORENSIS, sp. nov.

A small species with cuneiform wings, thoracic markings light brown, male hypopygium very characteristic, anal point broad and truncate. At first sight this species resembles *Stempellina*, but the costa ends just beyond tip of M_{3+4} and the scutellum has 3 pairs of bristles.

Wing length.—1·5 mm.

Male.—*Head* and mouthparts light brown, antennae darker, A.R. about 1·0, eyes kidney-shaped, frontal tubercles absent. *Thorax* yellowish green with pale brown stripes; scutellum with 3 pairs of bristles. *Legs* yellowish brown, pulvilli absent, L.R. about 2·0, beard absent, posterior tibial combs separate, each with a short spur. *Wings* strongly cuneiform, posterior margin with a definite angle just basal to *Cu*, anal margin straight, lobe quite absent; macrotrichia present over most of surface, but absent alongside veins; costa reaching just beyond level of apex of M_{3+4}. Abdomen pale green; hypopygium (Fig. 27, *c*) with a peculiar flattened and truncate anal point; 9th tergite carrying spaced hairs with distinct pits; appendage 1 oval, rather more hairy than usual, 1*a* present, curved, and pointed; 2*a* curved in dorsal view, in lateral aspect seen to have a ventral brush of slightly broadened hairs.

Female.—Very similar to male, especially in wing characters.

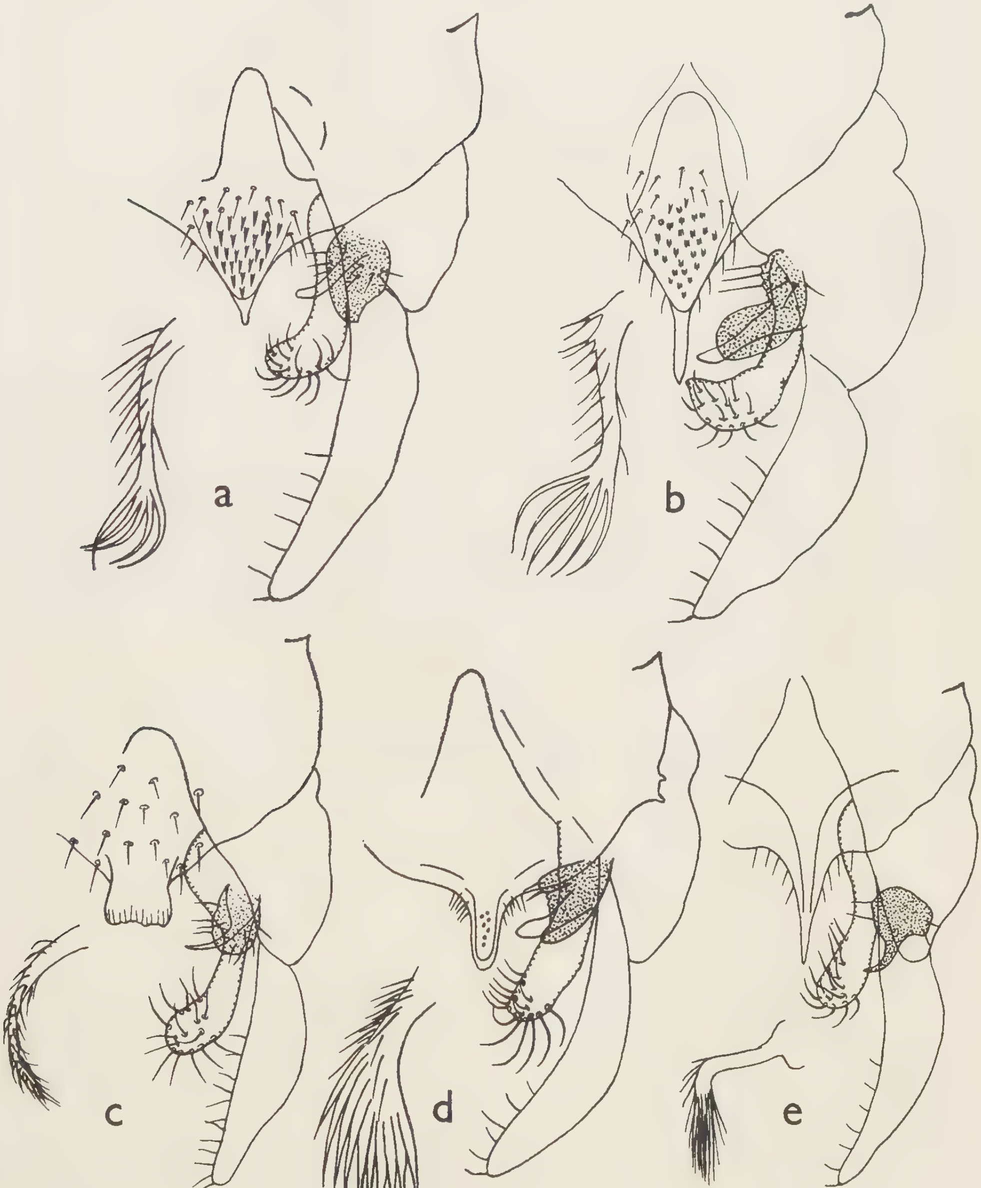

Fig. 27.—Male hypopygia of *Tanytarsus* (*Tanytarsus*), appendage 2*a* shown separately but to same scale: *a, T. spinosus; b, T. palmatus; c, T. belmorensis; d, T. bispinosus; e, T. sydneyensis.*

Types.—Holotype ♂ and 1 ♂ and 1 ♀ paratypes from Belmore Falls, N.S.W., 2.x.1938, A. L. Tonnoir. Male paratype retained in BM, holotype and female paratype returned to CSIRO.

TANYTARSUS (TANYTARSUS) SPINOSUS, sp. nov.

Green with reddish yellow thoracic markings; the distinctive features of this and the next species lie in the male hypopygium with its spiny apex to the 9th tergite and long appendage 2*a* carrying broad spines at the apex. The present species differs from the next in the oval shape of appendage 1*a*, the short anal point with simple spines on the tergite and the 5 spines at the apex of 2*a*, although this number may be variable. It would be interesting to examine further material of each species to see the range of variation in each.

Wing length.—1·9–2·0 mm.

Male.—*Head*, mouthparts, and antennae yellowish green, dorsal narrow portions to eyes scarcely developed, frontal tubercles not visible, A.R. 1·0. *Thorax* pale green; stripes, postnotum, and sternopleuron reddish yellow. *Legs* green, beard absent, L.R. 2·75, pulvilli absent, combs fairly large, clearly separated and each armed with a spur. *Wings* clothed over most of the surface with macrotrichia, though more sparsely in basal half, apex of costa beyond level of apex of M_{3+4}. *Abdomen* plain green; hypopygium (Fig. 27, *a*) with short anal point and that part of 9th tergite immediately basal to it set with short thick spines; appendage 1 subovate, 1*a* present, 2*a* long, hairy, and terminating in 5 broad curved spines, not unlike the palm of a hand.

Female.—There is a single female carried on the same mount as one of the males; it resembles the male but equally resembles females of other species. More material might assist in finding reliable characters for the separation of the species in this sex.

Types.—Holotype ♂ and 2 ♂, and 1 ♀ (?) paratypes from Healesville, Vic., 21.iv.1929, F. E. Wilson. One paratype retained in BM, holotype and remainder returned to NM.

TANYTARSUS (TANYTARSUS) PALMATUS, sp. nov.

The essential differences between this species and *spinosus* lie in the male hypopygium. They may only be forms of one and the same species, but there are sufficient differences in the material available for them to be treated as separate until more specimens are captured in other localities.

In this species, the anal point (Fig. 27, *b*) is much longer and the spines are more erect, thus appearing more as dots, and most of them are trifid; appendage 1 is of a different shape with the apical half more inflated; 2*a* has some of the basal hairs with a common origin and also 6 spines at the apex (possibly variable). The differences in the shape of coxite and styles seen in the figures could easily have been caused in the mounting.

Types.—Holotype ♂ and 1 ♂ paratype from Warragul, Vic., 30.vi.1929, F. E. Wilson. Holotype returned to NM, paratype retained in BM.

TANYTARSUS (TANYTARSUS) BISPINOSUS, sp. nov.

Greenish species, thorax with brown markings, including a broad vertical band on pleuron; abdomen with dark rings; appendage 2*a* of male large and with flattened hairs forming a fan.

Wing length.—2·0 mm.

Male.—Head yellowish, mouthparts and antennae brown, frontal tubercles present, A.R. about 1·2, dorsal narrow portion of eyes well formed. *Thorax* yellowish; stripes and postnotum brown, pleuron largely occupied by a broad vertical brown stripe. *Legs* yellowish and without markings, pulvilli absent, beard absent, L.R. 2·75, combs separate, occupying about half the diameter and each with a spur. *Wings* clothed over most of the surface with macrotrichia; costa ending before wing apex but beyond level of apex of M_{1+2}. *Abdomen* greenish, each segment with a broad dark band, placed more or less centrally. *Hypopygium* (Fig. 27, *d*) without well-formed row of dots on anal point, but with a few small dots placed irregularly; tergite with 2 small spines laterally; appendage 1 broad, 1*a* large, 2*a* large and with flat fan-like arrangement of broadened hairs.

Female.—Not known.

Types.—Holotype ♂ from Hornsby, N.S.W., 9.i.1958; paratypes, same locality, 22.iii.1958, 2 ♂♂, and 9.iv.1958, 1 ♂, D. J. Lee. Further paratype from Mosman, N.S.W., 9.iii.1957, W. W. Wirth, 1 ♂. Holotype and 1 paratype returned to SPHTM, two paratypes retained in BM, one paratype returned to USNM.

TANYTARSUS (TANYTARSUS) SYDNEYENSIS Kieffer

Tanytarsus sydneyensis Kieffer, 1917, p. 224.

A pale greenish species with reddish yellow thoracic markings, eyes with dorsal narrow portion rather poorly formed, tarsal beard absent. Best distinguished by the male hypopygium in which anal point lacks dots and appendage 1 carries a narrow curved style. The type series is no longer available, but from the description it seems likely that this was the species Kieffer had before him.

Wing length.—1·5–2·0 mm.

Male.—Head, mouthparts, and antennae brownish, A.R. hardly 1·0; eyes strongly reniform, dorsal narrow portion poorly developed, frontal tubercles present. *Thorax* very pale yellowish with reddish yellow stripes, postnotum, and sternopleuron. *Legs* pale yellow, L.R. about 2·5, beard absent, combs well formed, each with a spur. *Wings* with macrotrichia over most of surface, only the base of the basal cells being bare; costa ending beyond level of apex of M_{1+2}; halteres pale. *Abdomen* clear green, unmarked; hypopygium (Fig. 27, *e*) lacking row of dots on anal point which is narrow and pointed; appendage 1 with long curved style, 1*a* absent, 2*a* bent and with a brush of simple hairs.

Female.—Similar to male.

Types.—The type series from Sydney was in the Hungarian National Museum.

Specimens seen.—NEW SOUTH WALES: Lake Illawarra, 10.i.1948, R. H. Wharton, 7 ♂♂, 1 ♀; Narrabeen, Oct.–Dec. 1956, W. W. Wirth, 15 ♂♂; Sydney, Careel Bay, and Hornsby, Nov. 1957–Jan. 1958, D. J. Lee, numerous specimens.

TANYTARSUS (CLADOTANYTARSUS) ? MANCUS (Walker)

Chironomus mancus Walker, 1856*b*, p. 161.

Tanytarsus (*Tanytarsus*) *mancus* Edwards, 1929, p. 418.

Australian specimens falling here seem to be inseparable from European material and the author is forced to regard them as belonging to the same species. The name is queried so that future students may treat the identification with caution.

Species dark green in colour, thorax either mainly black or with only stripes, postnotum and sternopleuron black; frontal tubercles absent, L.R. about 1·8, pulvilli absent, combs small, well separated, and each with a spur. Hypopygium quite characteristic (Fig. 28, *b*), anal point stout and pointed, with a few dots, appendage 1*a* very long, 2*a* long and with branched hairs, styles short. Wings with macrotrichia only at extreme apex, as lines in cells R_5 and M_1 and at apex of fork cell.

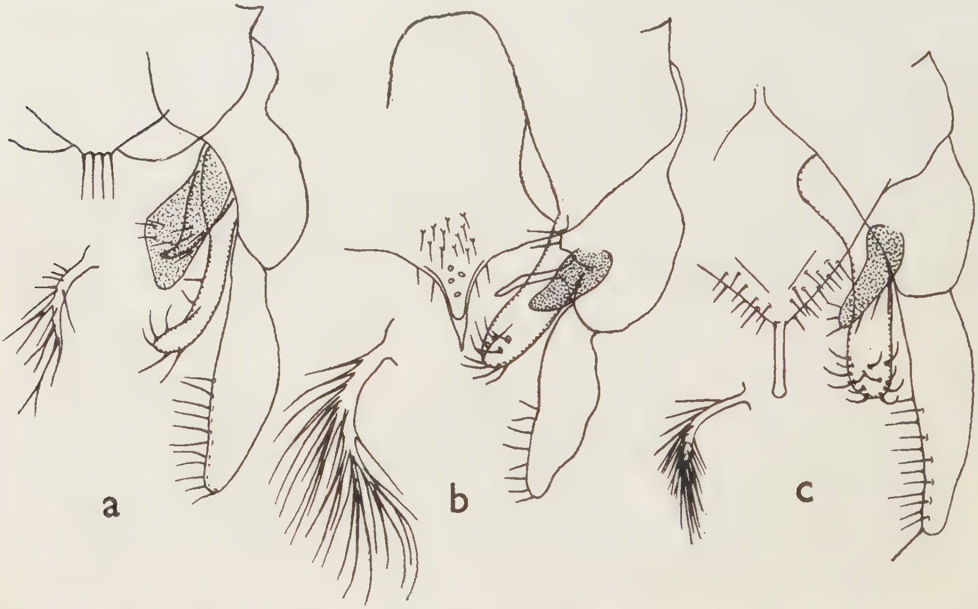

Fig. 28.—Male hypopygia, appendage 2*a* shown separately, of: *a, Tanytarsus* (*Cladotanytarsus*) *furcatus; b, T.* (*C.*) *? mancus; c, Stempellina australiensis.*

Australian specimens seen.—NEW SOUTH WALES: Hornsby, Nov. 1957–Jan. 1958, D. J. Lee, 7 ♂♂. WESTERN AUSTRALIA: Wilgarup R., Apr. 1958, D. H. Edward, 4 ♂♂.

TANYTARSUS (?CLADOTANYTARSUS) FURCATUS, sp. nov.

At first sight this shows great resemblance to *T.* (*T.*) *belmorensis* but the male hypopygium (Fig. 28, *a*) shows it to be completely different and probably a species of the subgenus *Cladotanytarsus*. In colour, size, and general structure it is very similar to *belmorensis*, but it has a darker, browner abdomen, no angle to the posterior wing margin, although the anal margin is straight and wing macrotrichia sparser, being present only at the tip and as lines in the cells.

The 9th tergite is softer and less sclerotized and quite lacking in hairs except for 4 stout ones in the position of the anal point of other species; appendage 1 broad, 1*a* bent at the apex, 2 narrower than in other species, 2*a* with a few long hairs, some being forked.

Types.—Holotype ♂ and 2 ♂ paratypes from Belmore Falls, N.S.W., 2.x.1938, A. L. Tonnoir. One paratype retained in BM, holotype and other paratype returned to CSIRO.

Genus STEMPELLINA Bause

Stempellina Bause, 1914, p. 120. Freeman, 1958, p. 352.

Type species *Tanytarsus bausei* Kieffer, 1911.

Very similar to *Tanytarsus* but separated as follows: male antenna with only 11 distinct segments, scutellum with only 2 long bristles which are placed close together at the apex, wings cuneiform and lacking anal angle, fringe long, R_{4+5} ending before or above tip of M_{3+4}. In addition, the eyes are bare, small frontal tubercles are present, and there may be 1 or 2 spurs on the posterior tibia.

Most species in this genus are small or very small, the Palaearctic ones have larvae with a case-bearing habit similar to that of *Zavrelia*. Besides the species described below it is probable that *Tanytarsus modicus* Skuse should be placed here, although, being described from a female, little more than that can be said at present.

STEMPELLINA AUSTRALIENSIS, sp. nov.

A small dark green species with blackish thoracic markings. Male hypopygium very similar indeed to that of the Palaearctic species *bausei* Kieffer, but there are 2 spurs on the hind tibia and more macrotrichia on the wing surface and, therefore, it is being treated as a separate species.

Wing length.—1·5 mm.

Male.—*Head* green, mouthparts and antennae browish, A.R. about 1, frontal tubercles present, eyes completely lacking dorsal narrow portions. *Thorax* green with stripes, postnotum, and sternopleuron black; scutellum bearing a single pair of long bristles placed close together near centre. *Legs* greenish, L.R. about 1·8, tarsal beard absent, pulvilli present, combs small and separate, each with a short spur. *Wings* cuneiform, costa retracted and ending well basal to level of apex of M_{3+4}, macrotrichia present at apex and as single or double rows down centres of long cells and round margin of anal cell; halteres green. *Abdomen* green, hypopygium (Fig. 28, *c*) with long styles and narrow anal point, appendage 1 stout, 1*a* absent, 2*a* curved and with simple hairs.

Female.—Not known.

Types.—Holotype ♂ from South Creek, Dee Why, N.S.W., 27.ix.1956, W. W. Wirth; paratype, same data but 23.x.1956, 1 ♂. Holotype returned to USNM, paratype retained in BM.

Genus PONTOMYIA Edwards

Pontomyia Edwards, 1926, p. 796. Buxton, 1926, pp. 807–14.

Type species *Pontomyia natans* Edwards, 1926.

This genus was erected for an extraordinary submarine species from Samoa. The following definition is taken from Edwards (1926):

> "*Male*.—Antennae 15-segmented, long, slender and bare; palpi large and 2-segmented; labium atrophied. Anterior legs long, first tarsal segment longer than tibia, claws absent; mid legs short and stout, claws of peculiar structure; hind legs long, claws rudimentary, no tibial comb or spurs, no empodium. Wings reduced in size, the basal part puffed out, the tip flattened and jointed, venation not clearly distinguishable. Tip of abdomen permanently rotated through 180°.
>
> *Female*.—Vermiform, without appendages except for the rudimentary posterior legs.
>
> *Larvae* and *pupae* resembling those of *Tanytarsus*."

For a full account of this peculiar genus, reference should be made to the two papers cited above. A second species has been described from South Australia.

PONTOMYIA COTTONI Womersley

Pontomyia cottoni Womersley, 1937, pp. 102–3.

Only the male is known and is said to differ from the type species as follows: eyes pubescent; tarsi of posterior legs lacking even rudiments of claws, ventral tubercle of 5th tarsal segment large and sucker-like; 7th abdominal segment not asymmetrical and lacks the prolongation figured by Edwards for *natans*.

The author has not seen any specimens of this species which was recorded from Reevesby I., S. Aust. The Australian species was captured while sieving surface sand for small crustacea and they were seen skipping about in slight depressions in the drier sand close to the water's edge. This might suggest that it is not as truly submarine as *natans*.

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